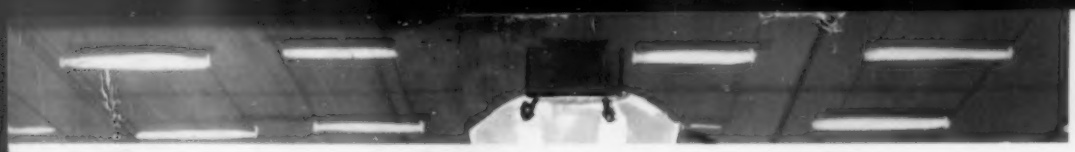

FOR
BETTER MANAGEMENT
OF
PLANT OPERATIONS

FACTORY

august 1960

PRICE ONE DOLLAR

A McGRAW-HILL PUBLICATION

GET MORE FOR YOUR NEW PLANT DOLLAR
p. 96

COVER STORY
CONTROLLED PLANT INFORMATION
Introducing a new concept in factory management
p. 60

HOW TO CURB ELECTRICAL ACCIDENTS
p. 216

RELIABILITY:

Reason enough to buy LeBlond

Valuable as five fingers on a hand, these five great LeBlond lathes run round the clock, year in, year out, at the Warren, Ohio, shops of Wean Manufacturing Co. Wean has six LeBlonds in all, including the five in the picture, all purchased in the last five years.

The operations they perform are typically job-shop. Lots are small—five parts alike are a big run; materials may vary from hardened steel to copper. Fat mill rolls, long whippy spindles, sturdy stepped shafts—the rugged LeBlonds take them as they come and turn them quickly and accurately, regular as clockwork.

Much of Wean's output goes into steel mill equipment that can be relied on to hold up under the most exacting requirements—the same steadfast degree of reliability that LeBlond lathe customers expect, and get.

RELIABILITY is a good reason to buy a lathe. It is reason enough to buy LeBlond.

See LeBlond Booth 810 at the Machine Tool Exposition in Chicago, September 6—16. MMT-PE

THE R. K. LEBLOND MACHINE TOOL COMPANY
Cincinnati 8, Ohio

LeBLOND *of Cincinnati*

For more facts circle 382 on **READER SERVICE CARD**

B.F.Goodrich

Hose outlasted pipe 7½ years

B.F.Goodrich improvements in rubber brought extra savings

THE tubes going down that wall aren't metal pipes but hose. A mixture of fly ash and acid water with sharp slivers of metal in it had been eating holes in pipe within six months. Each pipe replacement cost $700 plus about 100 hours of workers' time.

Then B.F.Goodrich hose was put on the job, had been there 8 years when the picture was taken. This is a kind of hose with a lining so tough it has been used in some places to handle broken glass and granite chips.

Smart plant engineers and purchasing men, working with a B.F.Goodrich distributor, had decided to try this special hose instead of pipe. By lasting 7½ years longer than pipe, they now figure that the B.F.Goodrich hose had saved $6400 in replacement costs and $4800 worth of maintenance time.

The hose is at a steel company's power plant. It gulps thousands of gallons of water and grit every day but shows no sign of wear, looks good for many years more.

Your B.F.Goodrich distributor has exact specifications for the B.F.Goodrich hose described here. And, as a factory-trained specialist in rubber products, he can answer your questions about *all* the rubber products B.F.Goodrich makes for industry. *B.F.Goodrich Industrial Products Company, Dept. M-881, Akron 18, Ohio.*

B.F.Goodrich ***industrial rubber products***

FOR BETTER
• PLANT MAINTENANCE & ENGINEERING
• PRODUCTION
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AUGUST 1960

FACTORY

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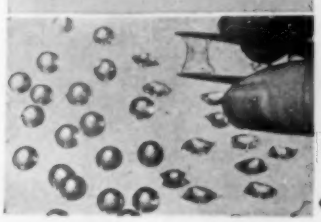

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COMING

In September you'll read about the latest **modernization** move being directed by the dynamic management group at Brunswick Corporation's Muskegon, Mich., manufacturing complex . . . You'll also take a second exciting and timely look at the vital role management is playing in the world of government and **politics** . . . And you'll be surprised when you discover how one company turned a big **layoff** into a big morale booster.

THE COVER

At ITT (Clifton, N.J.), C. M. Hughes, data processing manager (left), watches with J. L. Cole (center) while M. J. DiLorenzo feeds production information into Stromberg (Time) Transacter. For more details, turn to page 65.

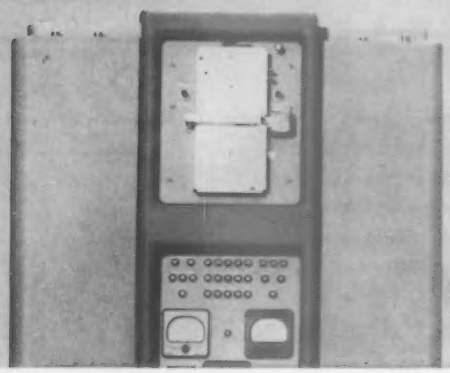
Painting by Frank Lacano

69TH YEAR OF PUBLICATION

AUGUST 1960 Vol. 118 No. 8

Published monthly by McGraw-Hill Publishing Company, Inc., 330 West 42nd St., New York 36, N. Y. Publication office: 99 N. Broadway, Albany 1, N. Y. Second-class postage paid at Albany, N. Y. Subscription in U.S.A.: $2 a year. For further details, see page 10.

"Our study showed the Bendix G-15 computer will save us $100,000 a year"



Walter T. Jones, Jr.

WALTER T. JONES, JR.
MANAGER, COMPUTING AND ACCOUNTING DEPARTMENT
QUEEN KNITTING MILLS, INC.,
PHILADELPHIA

Queen Knitting Mills has massive production and inventory control problems . . . the kind usually handled on medium to high-price computers. After a detailed study, however, Queen selected the low-cost Bendix G-15. *"It does the whole job for us,"* says Mr. Jones, *"at one-half the cost of competitive equipment."*

As one of America's largest manufacturers of women's summer sportswear, Queen Knitting Mills will save $100,000 per year by eliminating overstock and loss of sales due to understock. In analyzing the G-15, Queen considered these features:

EXPANDABILITY The G-15 is the only low-cost computer that provides magnetic tape units, and can accept paper tape punched by various office accounting machines. Addition of the G-15 Punched Card Coupler makes the computer the lowest-cost punched card computer system available. The basic G-15, however, is a complete operating computer. It comes equipped with an alphanumeric typewriter, a paper tape punch, and a photoelectric paper tape reader.

VERSATILITY & RELIABILITY There are more than 250 G-15's installed, handling an extremely wide variety of business and scientific problems. "Uptime" for all these machines has been better than 95%.

SPEED Queen's study showed the G-15 is faster than other computers in its price range. *Delivery speed* is excellent, too.

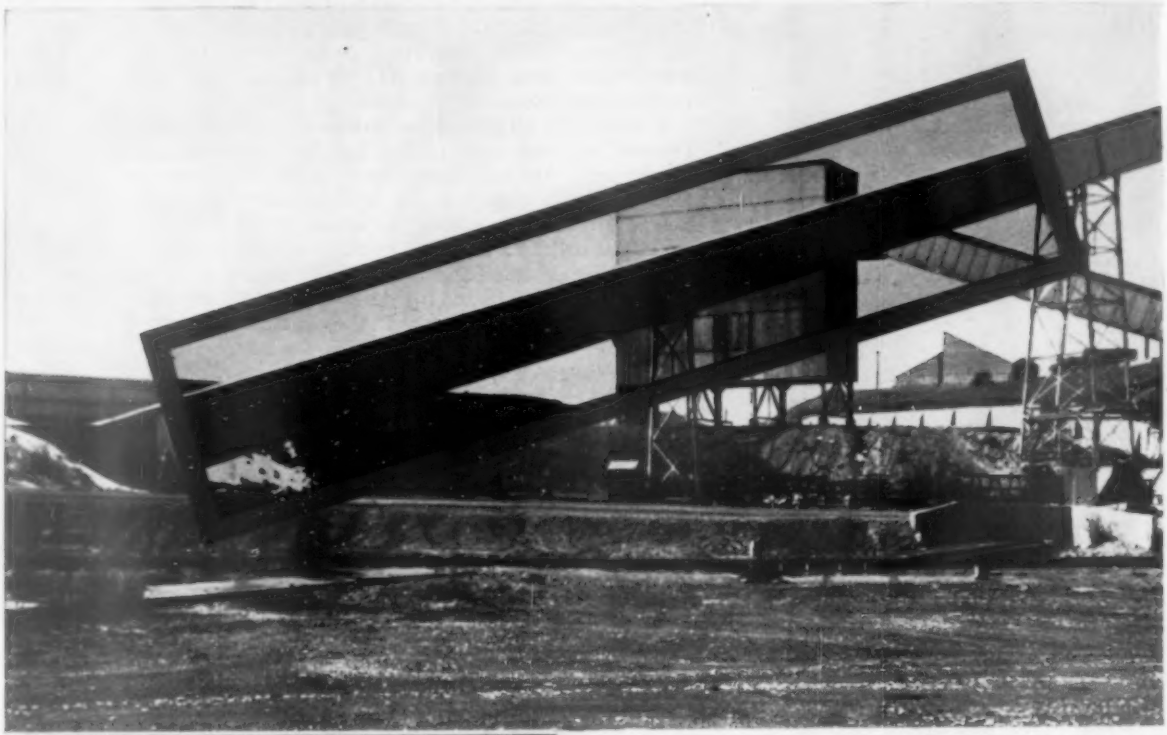
Write for complete details.

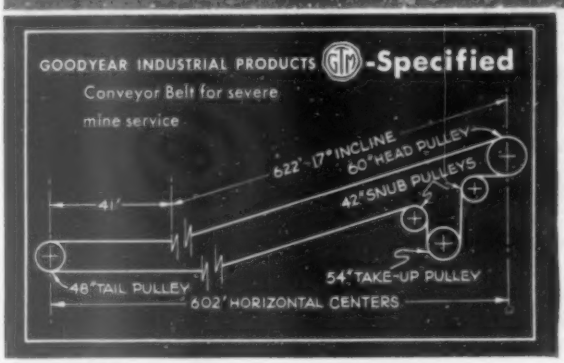
Bendix Computer Division
DEPT. AF-20, LOS ANGELES 45, CALIF.

Bendix

For more facts Circle 385 on Reader Service Card

How do you get the coal out of a rich, new mine—at the lowest cost and with the fewest problems over the long haul? That was the problem this mine's management tossed at a top conveyor belt expert, the G.T.M.—Goodyear Technical Man—about 9 years ago. So, after a careful study of particular mine conditions, he made his recommendation: super-tough, abrasion-resistant STACKER GRADE Belting for a 622-foot slope. How well did this recommendation stand up? Although the G.T.M.'s belt operates under very wet conditions—carries large chunks of coal and slate to the cleaning plant—it had handled 50 million tons of r.o.m. coal at last report. Service-life had been without problems. What's more, a searching check showed it good for additional millions of tons.





When you can't afford to gamble on anything but the best—in belts or any other industrial rubber product—check with an expert, the G.T.M.

Your Goodyear Distributor can arrange a G.T.M. visit anywhere—any time—in short order. He's also your man for the finest in V-Belt, Hose, Flat Belts and other products. You'll find your distributor's name and number under "Rubber Goods" or "Rubber Products" in the Yellow Pages. Or write Goodyear, Industrial Products Division, Akron 16, Ohio.

THE BIG NAME IN CONVEYOR BELTS:

GOODYEAR

THE GREATEST NAME IN RUBBER

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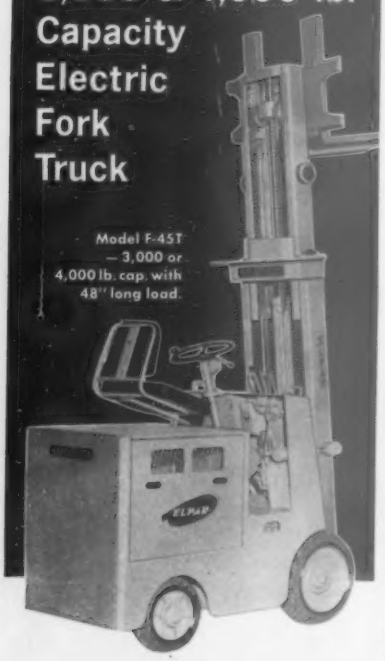

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FACTORY LETTERS

Plaudits for politics piece

Dear Sir:

I believe the Boeing Company would go along with most of the major points of view relating both to philosophy and procedure that were expressed or implied in "Should Plant Management Play the Game of Politics," June FACTORY, page 89. Your six critical questions are indeed all critical and get at some extremely complex problems.

I think I might have answered a few of them differently, and particularly Question No. 1: "Is the political action movement just another management fad?" I sincerely hope it is not, but I believe it could easily become a fad which very quickly goes out of vogue. This, I think, could take place if corporate managements measure the program by the results of near-term elections. I think this is truly a program for the long pull and I think any corporation must have, as a major motivation for its involvement in public affairs, a deep and continuing concern for our entire system of government.

One final thought—we believe it is extremely important for the corporation to clearly separate its program. In other words, if the corporation ever puts itself in the position of appearing to train its employees as a pool of lobbyists for the corporation, the entire program is doomed to failure.

Bruce W. Johnson
Public Affairs Manager
Boeing Airplane Co., Seattle

Dear Sir:

I think the article in June FACTORY, "Should Plant Management Play the Game of Politics" is excellent for several reasons:

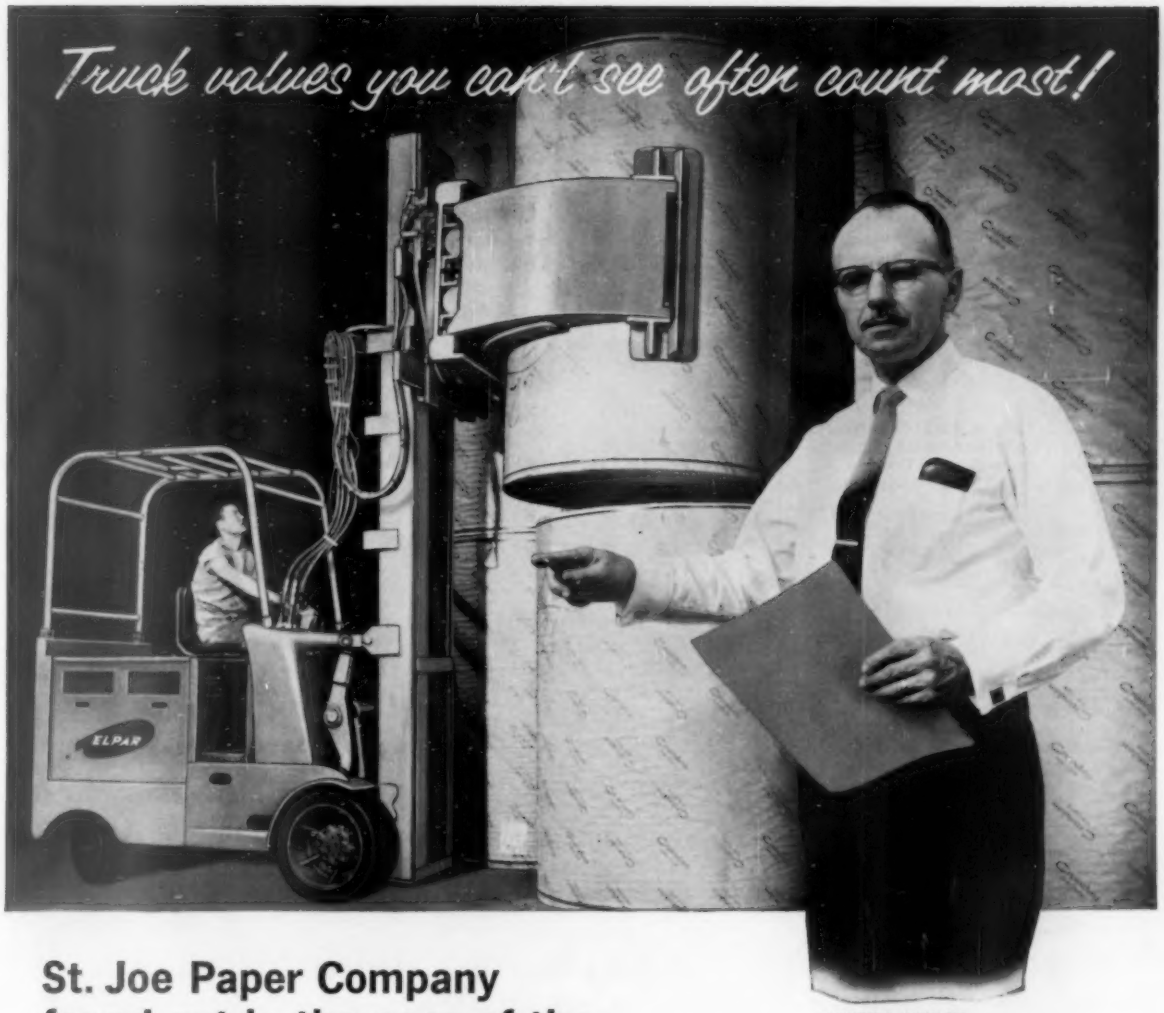
1. You show that young men are involved and have strong motivation.
2. FACTORY is probably read by a great many men in management who do not have ready access to the material which has appeared in other publications.
3. The layout of the article is provocative and makes for easy reading.
4. While the article covers both the pros and cons, it seems to me that its over-all result is to add to the cumulative effort to have management people understand that their talents are needed in politics and government.

(Name withheld)
Vice president, eastern manufacturing company

Dear Sir:

My congratulations on your article on political participation by businessmen in the June FACTORY. You have packed a great deal of information and frank statements of opinion into very few pages.

Mr. Mauro Checchio was a particularly happy choice



GEORGE ASHLEY
Southern Service Engineer

St. Joe Paper Company found out in the case of the

PAPER CLAMP EMERGENCY

It happened on a Saturday night, at the Houston Container plant of the St. Joe Paper Co. The roll paper clamps on two ELPAR trucks refused to function and there would be twenty cars of paper to unload first thing Monday morning. This paper was needed to produce containers used by Texas manufacturers.

St. Joe maintenance men, unable to find the trouble, put in an emergency call for ELPAR service engineer, George Ashley. He made a quick trip to the plant on Sunday morning. Within minutes he found the plungers on two hydraulic control valves were "frozen". A quick repair job and the trucks were in first class condition, ready to unload paper right on schedule Monday morning. As always, there was no charge for this emergency service.

Years ago, Elwell-Parker found out that a customer in trouble needs help immediately. That is why a nationwide service organization is set up. It gives fast, effective consultation on all kinds of maintenance and operating problems.

This exclusive ELPAR service is just one more example of the extra values ELPAR users enjoy. Write for a complete ELPAR truck catalog today.

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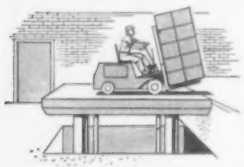
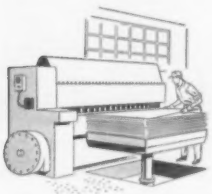
The Rotary Levelator Lift loads trucks from plant floor level, becomes part of floor when not in use. Economical, dependable oil-hydraulic operation.



Speed plant traffic

Move materials from one floor level to another on this heavy-duty hydraulic lift. Eliminates detours, saves space required for long ramps, and increases plant safety.



Efficient machine feeding

Keeping materials at convenient working level is just another use for versatile Rotary Levelator Lifts. Automatic controls speed operations, save on manpower required.

Rotary Oildraulic Levelator Lifts have countless applications in modern industry. Standard 6,000 and 12,000-lb. models are adaptable to many installations, special lifts with capacities to 300,000 lbs. or more can be engineered to your specifications. Mail coupon for more information.

Rotary Industrial Lifts

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Memphis, Tenn.—Chatham, Ont.

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Please send information on Rotary Levelator Lifts.

*Name*_____

*Address*_____

_____

and a man whom we like to think of as an outstanding exponent of political leadership among the 200 Johnson & Johnson employees who hold public office.

Your article tells how Richard F. Dede heard two talks on the subject of political participation a year apart and was then moved to take action. It's an amazing coincidence, but I think I was the speaker on both occasions. This is the first information I've had of the seed falling on fertile ground. I'll write him a letter of congratulations.

William H. Baumer
Special Assistant to the President
Johnson & Johnson, New Brunswick, N.J.

Girls will be girls

Dear Sir:

I'm a long-term, avid FACTORY reader, and thought you would get a kick out of part of a letter we received from an overseas plant, 6000 miles from its source of supply. Here are the lines:

"When the motor coupling was to be finally bolted up we were shocked to find that both housing halves were males. Normally, one is male and the other female. The reducer had to be slid out of position, the housing removed, and a female register machined in the reducer half.

"Our problem is solved, so nothing need be done for our needs. But will you please check your records and stop some other unfortunate victim from getting two females? That would really be bad. A male can be converted to a female, but not the reverse."

(Name withheld)

► Apparently, boys will not always be boys.—ED.

Our fan in Havana

Dear Sir:

I have had the opportunity, by subscribing to your excellent and interesting magazine, to "drink" in large quantities the extraordinary articles written in your monthly issues.

This may sound corny, but—this being my first test as industrial manager—the help and advice received through your literature have been great.

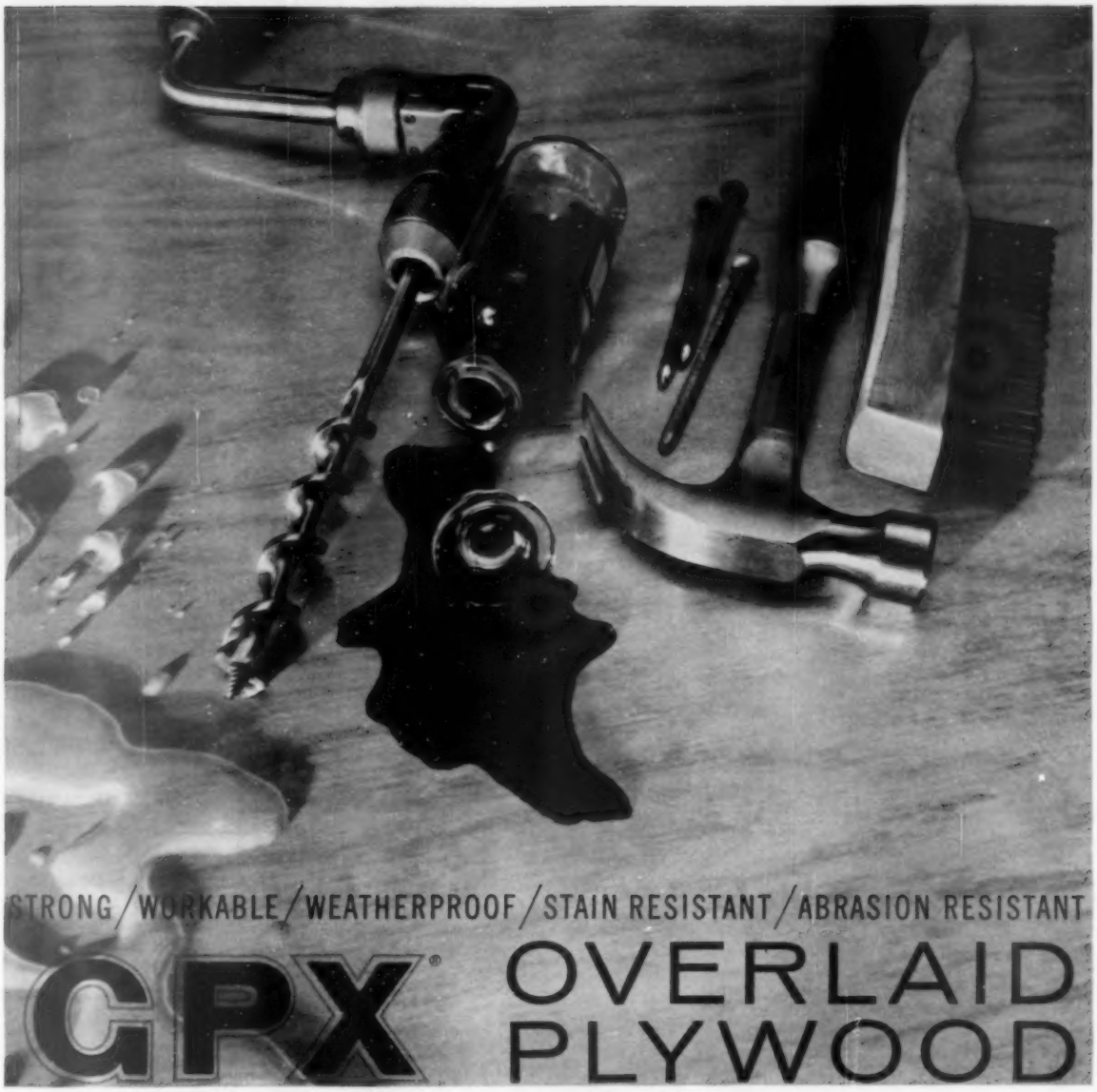
Octavio Godinez
Havana, Cuba

Good plant, good loser, good issue

Dear Sir:

We should like to congratulate FACTORY magazine and the winners in this year's (May 1960) Top Plants Competition. All the winning plants certainly represent many worthwhile features.

Of course, we would not be human if we did not feel a certain disappointment at not being chosen one of



in many cases does the work of transite, aluminum, even steel ...better, at less cost!

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Tanks – etching, dying, etc.	pallets
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SERIES 1300
¾" thick swivel top plate. Dust-proof self-contained swivel load bearing. Hardened ground and polished raceways. Timken combined radial and thrust bearing. Thick steel horn with reinforced ribs. Special alloy wheel with two Timken bearings.

7½ Tons
PER CASTER

When it comes to *CASTER STRENGTH* for rolling the big loads along your assembly line, or around your stock pile area, Faultless engineered casters can give a lift to your big production and warehousing problems. Above, a Faultless Series 1300 Swivel Plate Caster and two Faultless wheels in special mountings easily handle a 22,000 lb. Caterpillar Diesel-electric engine with minimum manpower; a usual task for the Faultless Series 1300 Dreadnaught Caster.

Super strong HX300 Casters handle loads up to

5 Tons
PER CASTER
WITH 8" WHEEL

For surplus strength to roll under cargoes that break down or damage ordinary casters, the HX300 Series, extra heavy duty swivel caster, will fit your specifications. It's precisely engineered throughout and constructed of quality materials to provide a caster capable of easily taking on 10,000 lb. loads, while keeping production lines moving with minimum handling costs.

SERIES HX-300
1" dia. king pin. Thick steel top plate. Self-contained main load bearing has dust guard and grease seal. Timken radial and thrust bearing. 8" or 10" semi-steel wheels with Timken bearings.

ASK YOUR DISTRIBUTOR: Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Both are listed in the phone book Yellow Pages, under "Casters," and the Faultless heading.

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Evansville 7, Indiana

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NOELTING Faultless Casters

Begins on page 6

the winners, particularly since our Johnstown plant, when evaluated within its own industry, namely the needle trade, represents construction, facilities manufacturing layout, and technique far ahead of the rest of this industry.

But the burden of competition becomes almost impossible when it is necessary to measure even the most modern and up-to-date needle trade plant against the abilities of major hard goods companies to construct new manufacturing facilities.

Stanley L. Marshall
Bali Brassiere Co., Inc.,
Long Island City, N.Y.

► Our editors were impressed with this plant. But they were even more impressed with 10 other entries in the competition. —ED.

FACTORY welcomes opinions and suggestions from its readers. They help us put management problems in better perspective. Letters should be addressed: The Editor, FACTORY, 330 West 42nd St., New York 36.

FACTORY

August 1960 Vol. 118, No. 8

A consolidation of Factory Management and Maintenance and Factory and Industrial Management, including Factory, and Maintenance Engineering. Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder.

Executive, Editorial, Circulation, and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N. Y.

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United States subscription rate for individuals in the field of the publication, $2, 1 year; $3, 2 years; $4, 3 years. Canadian rate, $3 per year. Foreign rate, $25 per year. Single copies in U.S.A., $1.

Title registered in U.S. Patent Office.

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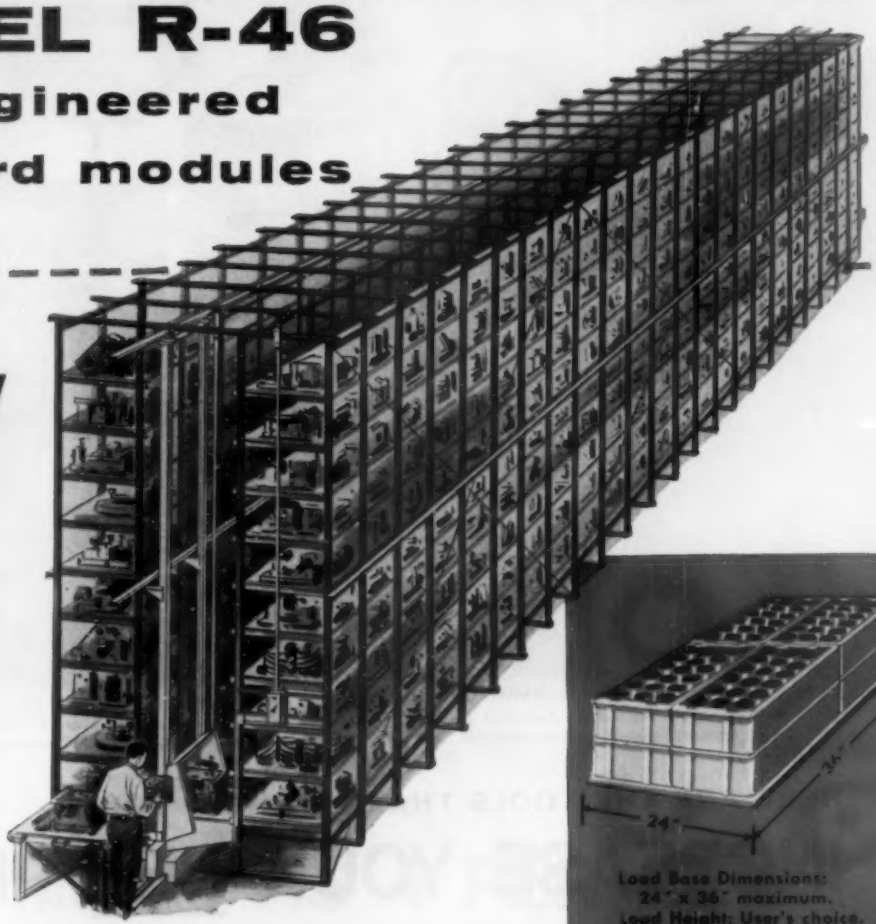
Announcing the TRIAX RETRIEVER MODEL R-46

pre-engineered

standard modules



PUSH-KEY material handling and storage

Load Base Dimensions: 24" x 36" maximum.
Load Height: User's choice.
Load Weight: 1000-lb. max.
Over-all Height: 12'—24'
Over-all Length: User's choice.

NEATER, BETTER, MORE EFFICIENT STORAGE OF TOOLS AND DIES

Floor-to-ceiling storage and narrow aisles free valuable manufacturing space, while heavy loads are stored or removed at fingertip control with the new standardized Triax R-46 Retriever. One user reports a 70 per cent savings in floor space and a 30 per cent savings in man-hour costs for storage of tools and dies. The R-46 Retriever is flexible in height and over-all length, pre-engineered to save you time . . . and money.

For complete information and specifications write or call:

The dual command console permits the operator to store one load and remove another in an uninterrupted cycle.

THE TRIAX COMPANY
SWeetbriar 1-9800
11955 SHAKER BLVD. • CLEVELAND 20, OHIO

'For more facts Circle 391 on Reader Service Card

MOVIE: "STOP LOSS WITH ORGANIZED LUBRICATION," a new 20-minute color-and-sound film created to show the opportunities for cost control through Organized Lubrication.

EDUCATIONAL FILM PACKAGE for plant departments consists of movies on greases, hydraulic oils, cutting oils, etc., that may be selected after seeing the "Stop Loss" film.

HERE ARE THE TOOLS THAT CAN HELP YOU

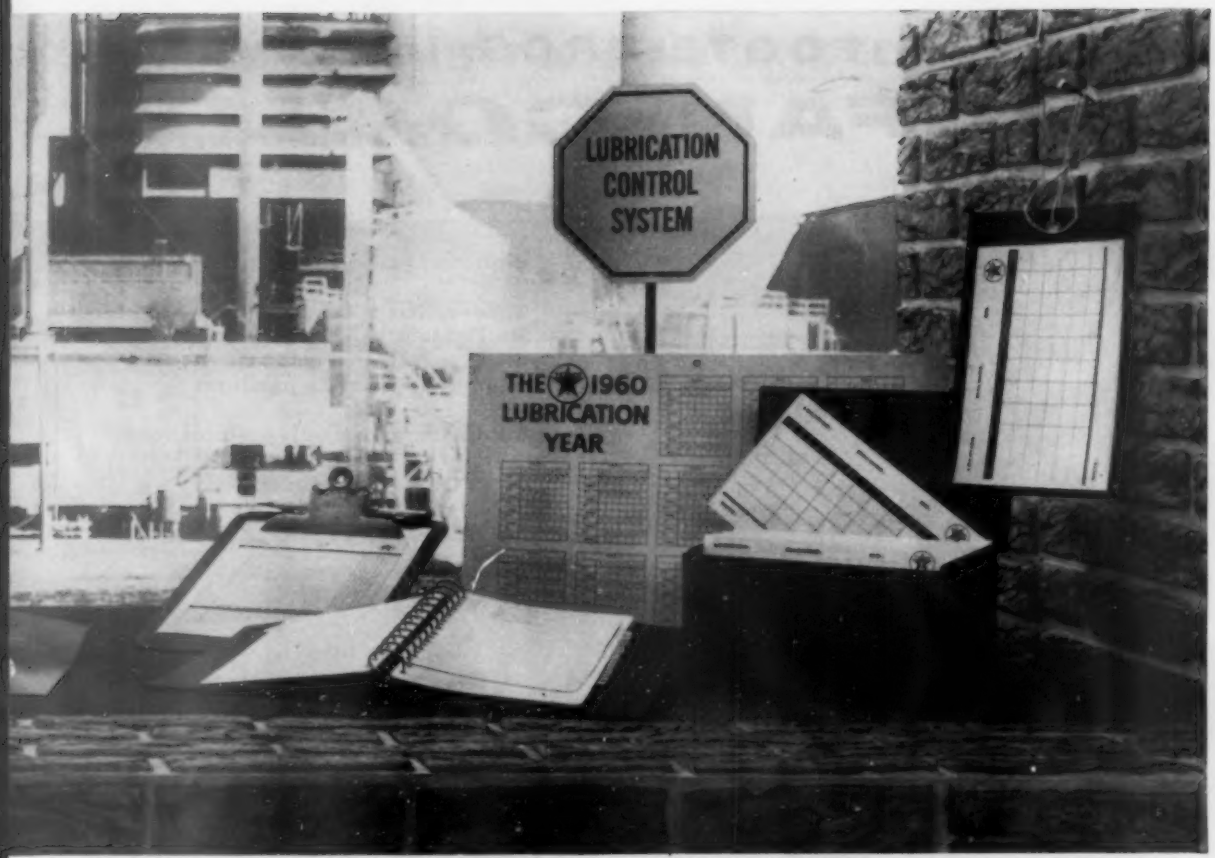
INCREASE YOUR NET PROFITS

Texaco's new "Stop Loss" program is designed to cut maintenance costs by modernizing lubrication practices. If yours is an average plant, the results can add 4 per cent to your net profit.

Even if your plant is an efficient operation, it is still virtually certain that there is an opportunity for cost control you are overlooking—either partially or completely. Here's what the Small Business Administration says in a recent publication:

Suppose there is an average plant, which sells $1,000,000 worth of goods per year. The net profit of this average company would be $73,400 and the maintenance cost would be $29,900. Now, suppose that by *better lubrication*, maintenance costs are reduced 10%, or $2990, *the $2990 will go directly into profit*—an increase of 4%.

A Texaco "Stop Loss" Program is designed for you. Texaco has developed a program specifically designed to help cut your maintenance costs via better lubrication practices. It will help you increase machine life, minimize downtime, reduce lube inventory, even cut purchasing costs. And the savings you make go directly into profits.



CO-ORDINATED BOOKLETS on the film subjects and others can be used as guides in specific areas.

TEXACO LUBRICATION CONTROL SYSTEM takes the guesswork out of your lubrication scheduling. It costs almost nothing to install, yet can add thousands of dollars a year to profits.

BY AS MUCH AS 4 PER CENT!

Can your plant pass this test? If the answer is "no" to any of the following questions, it is almost certain that a Texaco "Stop Loss" Program can improve your profit picture.

1. Is there a central source of responsibility in your plant for *all* lubrication? Yes ☐ No ☐
2. Can your machine operators devote all their time to production without worrying about lubrication? Yes ☐ No ☐
3. Is there any system for making sure that equipment gets lubricated in the right spots at the right time? Yes ☐ No ☐
4. Have you had a lubrication study made to eliminate costly duplication of lubricants? Yes ☐ No ☐
5. Are your oilers qualified men with knowledge of mechanisms lubricated? Yes ☐ No ☐

See for yourself how "Stop Loss" works! Texaco has just released a new color-and-sound movie to dramatize the benefits of good lubrication practices. It's called "Stop Loss through Organized Lubrication" and we think it would be valuable to you to see it. For a showing in your plant soon, mail in the coupon today!

Texaco Inc., 135 East 42nd Street, New York 17, N. Y.

MAKE YOUR RESERVATION TODAY!

TEXACO INC., Dept. F-160
135 East 42nd Street
New York 17, New York

I would like to see "Stop Loss through Organized Lubrication." Please call to arrange a showing in my plant.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

TEXACO

FOOTE BROS. introduces a FAN-COOLED

- High load carrying capacity
- Super-efficient 2-way cooling for higher thermal ratings
- Unlimited mounting positions
- Automatic and positive lubrication
- IN STOCK for immediate delivery

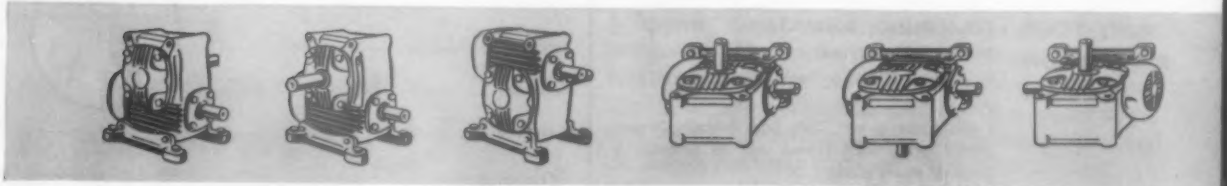
- 12 sizes—Center Distances from 1⅛" to 8"
- Rated to NEW AGMA Standards
- Ratios from 5:1 to 70:1
- Output torque to 46,000 lb. in.
- Input capacities from .01 to 66 HP

Foote Bros. RADICON Worm Gear Reducers incorporate *totally new* concepts of speed reducer design and construction. From the inside out and top to bottom, they embody years ahead thinking to provide users with more efficient, more versatile right angle power transmission in minimum size units.

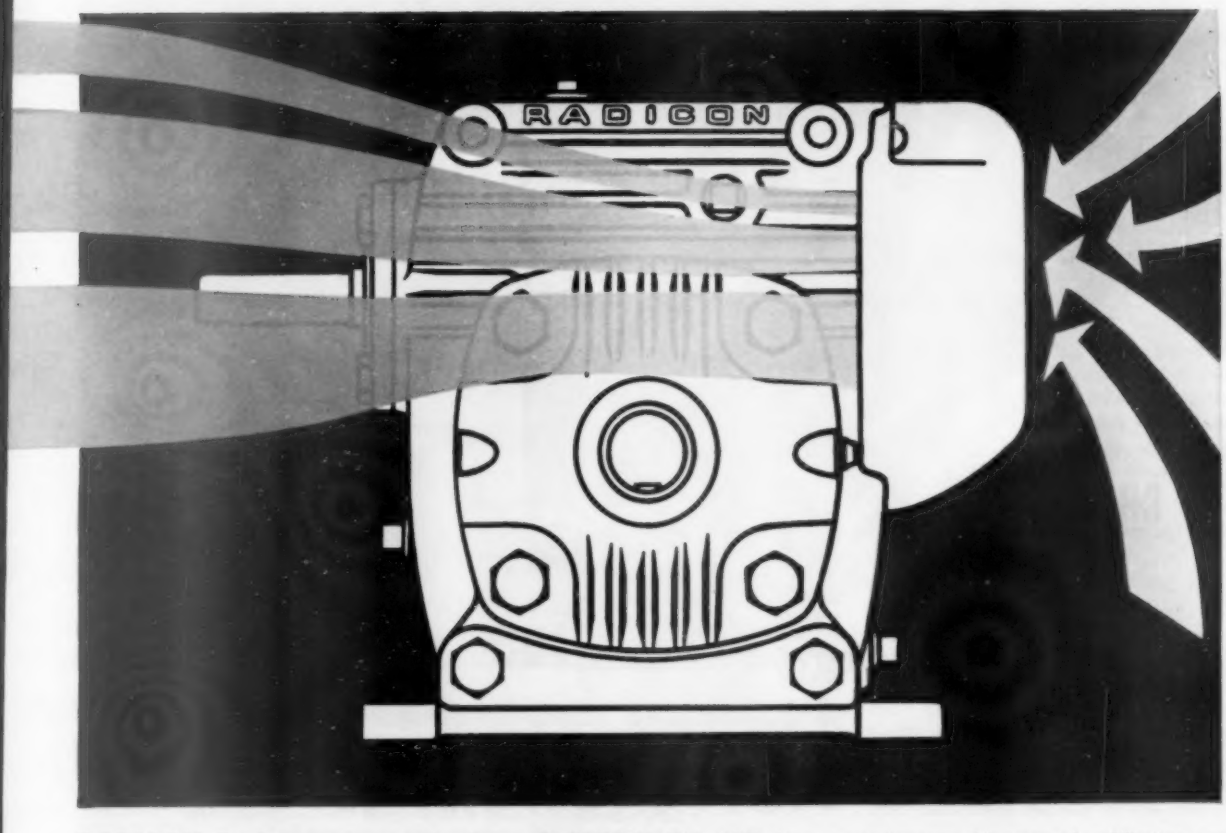
Gear accuracy and surface finish, bearing and shaft design, positive lubrication, extreme efficiency controlled cooling, the selection of materials and precision manufacturing techniques—all reflect careful attention to detail that results in higher load carrying capacity and maximum service life.

These outstanding new fan-cooled worm gear reducers are available now—carried IN STOCK by Authorized Foote Bros. Distributors for IMMEDIATE DELIVERY. See them soon. Get complete details on the performance, versatility, and service life they will bring you. Write for RADICON Catalog.

UNLIMITED MOUNTING POSITIONS



COMPLETELY NEW and ADVANCED line of WORM GEAR REDUCERS



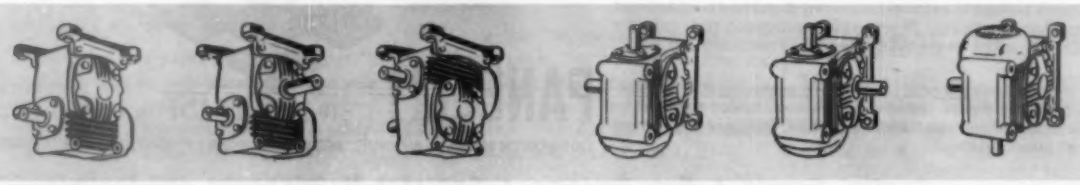
RADICON Reducers operate in a STREAM OF AIR for maximum thermal efficiency

Advanced design of RADICON Worm Gear Reducers and their high efficiency radiation and convection cooling for controlled transfer of heat to the outside air, permit *identical* thermal and mechanical ratings in most cases. For infrequent or intermittent service, thermal ratings can be ignored.

A moving stream of air, induced by the maximum diameter fan, forcing high velocity cooling air along horizontal channels formed by the external ribbing, dissipates radiated heat to hold the Reducer's temperature rise to a minimum. Cooling is equally efficient at any mounting position.

FOOTE BROS. GEAR AND MACHINE CORPORATION
4585 South Western Boulevard, Chicago 9, Illinois

POWER TRANSMISSION DRIVES



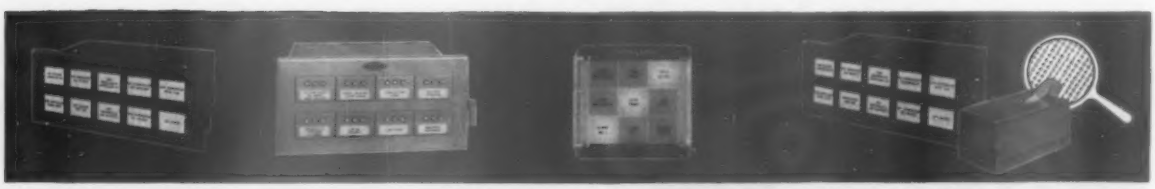
CHOOSE FROM THE

world's largest industrial annunciator line

AS VERSATILE AS YOUR REQUIREMENT

Lessens downtime by giving *instant visual* AND *audible alarms* when an "off-normal" occurs in your process. Time-saving—pinpoints trouble, permits faster correction and resumption of full production.

- Easily expandable universal system—rugged functional construction.
- Variety of sequences—interchangeable plug-in modules.
- Lowest installation cost—trouble-free operation.
- Over 1,000,000 service-proven hermetically-sealed Panalarm plug-in relays in use.



Universal All-Purpose Annunciator System—can continuously monitor all points in your process. Wide choice of visual and audible sequences (optional flashing, ringback, multi-color visual, momentary lock-in, lamp reset, etc.) permits differentiation between new and previously acknowledged alarms.

Digital Sequential Annunciator. Sequentially identifies your required off-normal points instantly. Handles any number of total alarm points. Clear binary readout. Millisecond resolution between points.

Miniature Solid State Annunciator—economical, lo-drain, intrinsically safe, no moving parts. Engineered for mounting in most standard miniature instrument cases. Compatible with high speed compact computer applications.

Recording Annunciator has both flashing visual and audible alarm simultaneous with exclusive digital alpha-numerical recording of operations. No time-wasting decoding, no useless blank tape accumulation. Automatic, permanent, unalterable statistical record saves operator's time, reduces chance of operator error, permits closer supervision. Equally effective in manned or unmanned locations.

All annunciators available in a considerable variety of standard sizes, cabinets and sequences to economically fit your exact requirement. Write today for descriptive catalog which also details Panalarm's unique quality features.

Panalarm manufactures the most complete line of annunciators for information and control. For an optimum competitively priced Annunciator System for your plant, consult Panellit engineers. Sales and engineering offices in all principal cities.

PANELLIT A DIVISION OF **ISI** INCORPORATED

7401 NORTH HAMLIN AVENUE, SKOKIE, ILLINOIS • PHONE ORCHARD 5-2500

Annunciators • Control Panels • Data Systems • Contract Maintenance and Installation

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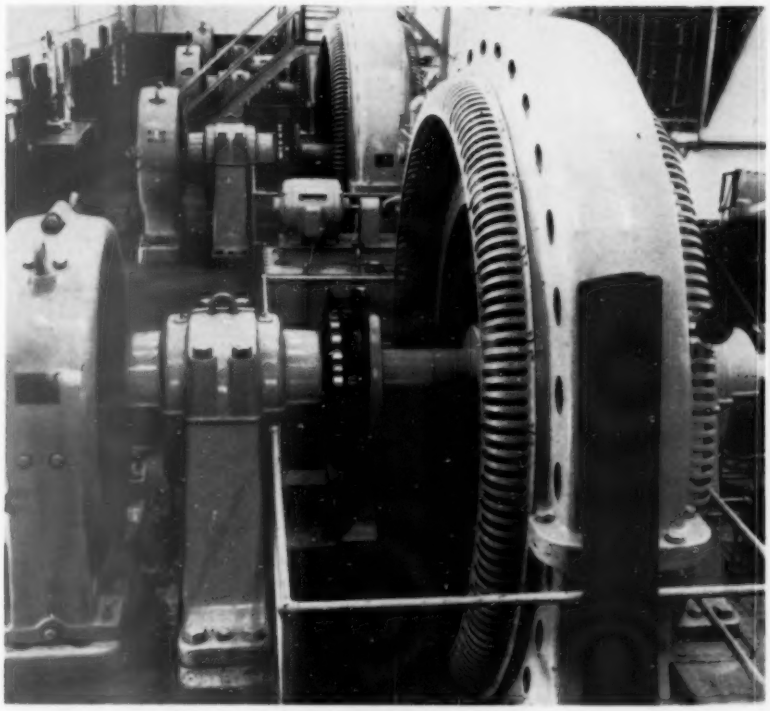
first in silicones

Dow Corning

SILICONE NEWS

production and maintenance edition • No. 36



UPRATE GENERATORS 45%

When one piece of electrical equipment fails you may be prepared for the situation. But what if three pieces go out? It can and did happen here.

A leading utility in the northwest depends on water power to generate a portion of their total output. All of its hydro-electric stations operate at full capacity.

Recently, three hydro-generators failed in one week. Loss of this generating power was critical. Time became all-important.

Only one spare set of coils was available. The other two units were identical: 3000 kw, 240 rpm, 3-phase, 60 cycle, 2200 v. Both units were operating far in excess of rated capacity and had previous failure records. In re-insulating them this time, it was agreed that superior heat-resistant materials should be used and that the generators should be uprated.

In rewinding the motor, Tinling and Powell chose an insulation system of silicone bonded mica-glass tape followed by impregnation with Dow Corning 997 Varnish —after two experiments with other materials produced unsatisfactory results.

The insulating tape was applied in four half-lap layers, followed by multiple dips in Dow Corning 997 Varnish.

The entire job — insulating 720 stator coils, 196 jumpers, 24 phase rings, and making 2360 silicone-glass laminate wedges and 650 silicone-glass cloth coil-connection covers impregnated with silicone varnish — was completed in only three weeks. And this includes considerable time for experimentation. Each generator was out of service only five weeks, a short time considering the size of the job.

The final result: The generators are back in service operating at 4000 to 4400 kw —loads of from 33 to 45 per cent above original rated capacity! . . . . **No. 647**

COLOR FOR HOT SURFACES

Now, when you paint plant "hot spots", whether they be indoors or out, you can do them up brown . . . or red or green, or most any other color for that matter. Color is new in heat-stable paints.

The new colors last because of silicones. Here's how a new "hot paint color" helped the E. V. Prentice Dryer Company, Incorporated, in Portland, Oregon.

The Prentice people have established a certain shade of green as a sort of "trademark" for their equipment. Naturally, wherever this color is used, they want to be sure it won't fade or become discolored. One of their products, a veneer dryer, was originally offered in aluminum only because of exposure to continuous heat of 450 F and corrosive gases from the drying wood.

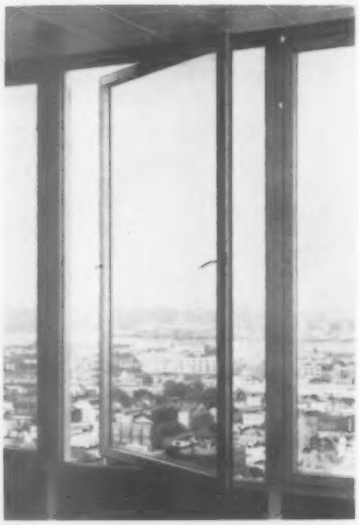
Seeking a way to successfully use their identifying green on the dryers, Prentice tried a silicone-alkyd paint based on a Dow Corning resin. The first veneer dryer painted with this coating was installed more than a year and (*Cont. pg. 2*)

Silicones in the CPI

The versatility and serviceability that Dow Corning Silicones bring to the Chemical Processing Industries are presented in a new brochure. (*Cont. pg. 2*)

FOR DATA RELATING TO THESE ARTICLES, CIRCLE REFERENCE NUMBER IN COUPON ON NEXT PAGE OR REFERENCE NUMBER ON READER SERVICE CARD

MORE



STOP RUBBER STICKING

Wherever rubber and metal come in contact for long periods of time, they tend to become very "fast friends". Here's a case history that shows how you can preserve rubber surfaces while solving rubber-metal sticking problems.

All windows of the First Western Building, Oakland, Calif., are pivoted in the center of the frame so half of the window swings in and half swings out. Around each window are Neoprene seals which contact the aluminum frames. Problem: How to lubricate these seals to keep them from sticking to the aluminum frames after months of exposure to heat, cold, moisture and general weathering.

Enter silicones! Kawneer Co., Richmond, Calif. — supplier of the windows — protected the Neoprene seals with a coating of Dow Corning silicone compound. Thus, any chance of deterioration or sticking was eliminated. Silicones, widely used as rubber release agents, prevent rubber from sticking to other surfaces because they assure virtually permanent lubrication: won't evaporate, oxidize, gum-up or attack the rubber seal in any way. Dow Corning compound is easy to apply and, being inert, can't possibly injure workers who apply it.

Have you any rubber-to-metal sticking problems in your plant? Give them the slip with silicones. . . . . *No. 648*

SILICONE PAINT *(Continued)*

one-half ago and it has yet to show any sign of discoloration.

Silicone-based coatings also resist corrosive atmospheres, rain, snow, sleet, sun, smoke . . . protect equipment exposed to weathering. Like to use color in the hot spots? Send today for a list of suppliers offering colored silicone paints. *No. 649*

CPI BROCHURE *(Continued)*

The brochure describes how the use of silicone materials raises productive capacity while lowering both production and maintenance costs. Included are sections on silicone paints, lubricants, defoamers, adhesives, rubber, electrical insulation.

Write for your copy of "How Silicones Work for the CPI", today. . . *No. 650*

new literature and technical data on silicones

Extend Motor Life — diminish maintenance trouble and cost. A case study reprinted from Plant Engineering shows how motors rewound with silicone insulation handle heavy duty cycles, shock loading and high ambient temperatures. Typical motor costs are compared, demonstrating how a silicone rewind program saves this firm $5000 a year. This 6-page, illustrated article gives the whole story . . . . . *No. 651*

Faster, Easier Release of casting metals, resin bonded shell molds, and wax or plastic patterns results from using Dow Corning silicone release agents. This data sheet suggests the best silicone release agents to use in die casting, ingot molding, molding nonferrous metals, precision investment casting, and shell molding. The easier, cleaner releasing performance and maintenance of these molds is described in . . . . . *No. 652*

Better Brick Buildings is the title of this full-color, 14-minute documentary film that lets you see for yourself why Silaneal treated brick reduces around-the-plant maintenance. Information on arrangements for a free showing in your plant can be obtained by asking for . . *No. 653*

Wire and cable insulated with Silastic is described in a new, 6-page illustrated brochure. It details the outstanding electrical properties, the wide service temperature range (—90 to 260 C) and the resistance to effects of weather, corona, ozone, and nuclear radiation of wire and cable insulated with Silastic. It's a valuable reference for all industries. Circle . . . . *No. 654*

Up-to-the-minute information on the effective lubrication of ball bearings and plastic parts operating at temperatures from —40 to 400 F is contained in a recently revised brochure describing Dow Corning 44 Grease. Actual case studies tell how savings have been made because of less frequent down time, smaller inventories, and generally reduced maintenance costs. Details of how 44 Grease can work for you are available by circling . . . . . *No. 655*

Dow Corning Corporation, Dept. 3688, Midland, Michigan
Please send me: 647 648 649 650 651 652 653 654 655

NAME _____

TITLE _____

COMPANY _____

STREET _____

CITY _____ ZONE ____ STATE _____

SILICONE NEWS is published for production and maintenance men by

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

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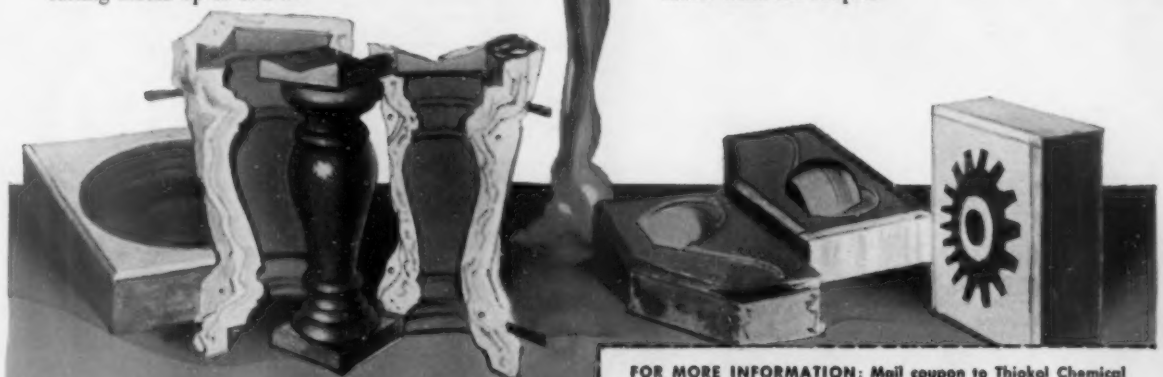
Wherever flexible tooling or molding techniques are adapted, compounds based on THIOKOL polysulfide polymer...

OUTCAST THEM ALL!

When polysulfide base materials supplement plaster of paris in originating, refining and producing molds, production efficiency and economy step up.

Properly formulated, these specialized materials pour easily and cure at room temperature. They are faithful to original models in detail and dimension. Accurate in reproduction. Unbreakable. Quickly reproducible. Unaffected by environmental conditions. Workable with practically all forms of cold casting media up to 250°F.

For over 10 years—automotive, aircraft and rubber manufacturers, pattern shops, potteries, foundries, art plaster shops and sculptors have successfully used THIOKOL polysulfide-base molding materials to develop prototype models and to produce perfectly cast parts in both small and large volume. Cold mold casting materials using THIOKOL polysulfide polymer are made commercially available by processors such as The Perma-Flex Mold Company. Want to know more? Send the coupon.



Thiokol®
CHEMICAL CORPORATION

780 NORTH CLINTON AVENUE • TRENTON 7, NEW JERSEY
In Canada: Naugatuck Chemicals Division, Dominion Rubber Co., Elmira, Ontario

®Registered trademark of the Thiokol Chemical Corporation for its liquid polymers, rocket propellents, plasticizers and other chemical products.

FOR MORE INFORMATION: Mail coupon to Thiokol Chemical Corp., Dept. FM-43, 780 N. Clinton Ave., Trenton 7, N. J.

Gentlemen: I'm interested in casting compounds based on THIOKOL polysulfide polymer. Please have details forwarded by manufacturers of these compounds.

Name_____

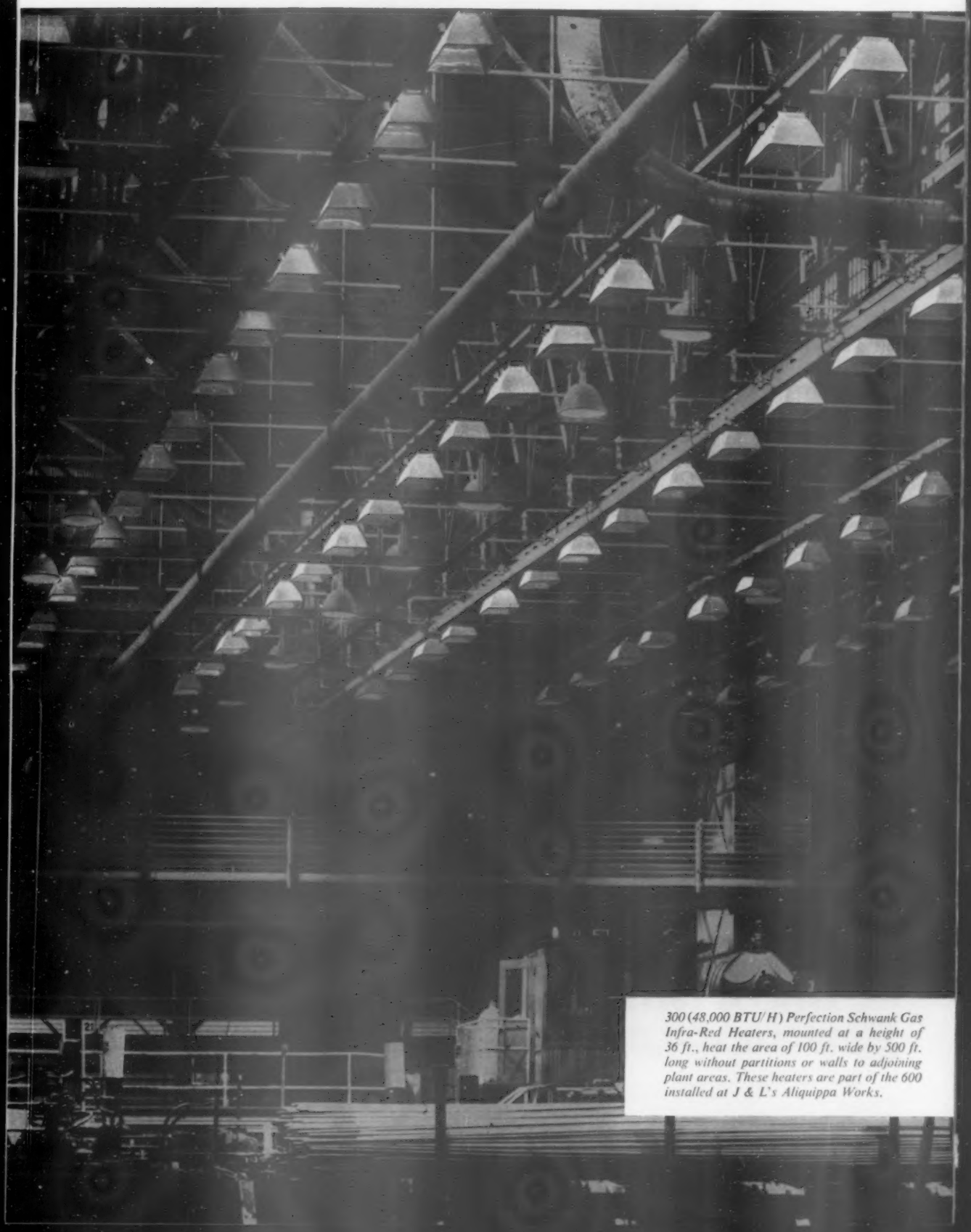
Firm_____

Street_____

City_____ Zone_____ State_____

Thiokol supplies only polysulfide liquid polymers as raw materials for compounding by others as finished products.

PERFECTION



300 (48,000 BTU/H) Perfection Schwank Gas Infra-Red Heaters, mounted at a height of 36 ft., heat the area of 100 ft. wide by 500 ft. long without partitions or walls to adjoining plant areas. These heaters are part of the 600 installed at J & L's Aliquippa Works.

SCHWANK Gas Infra-Red Heaters...

Meet J & L's Critical Heating Requirement...

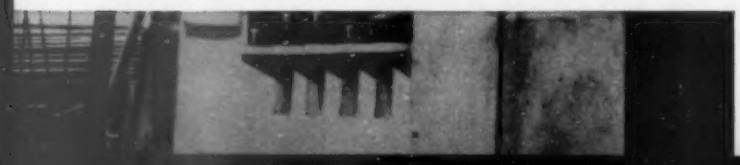
Save 46% in BTUs

Approved by A.G.A., Underwriters, C.G.A. and C.S.A.

Minimum 55° machinery temperature is necessary to guarantee peak operating efficiency of critical production equipment at Jones & Laughlin's No. 1 Continuous Weld Pipe Mill, Aliquippa, Pa. Replacing inefficient, costly and dirty salamanders, 300 Perfection Schwank Gas Infra-Red Heaters (600 in the entire plant) meet this tough requirement with a BTU capacity 46% *less* than any other proposed heating system. Total maintenance requirements consist of air blowing the units once each heating season. And, after three full seasons of dependable heat and employee comfort, not one of the 2,400 ceramic burners (4 per heater) has ever needed replacement. No wonder there are over 25,000 enthusiastic users of Perfection Schwank Gas Infra-Red Heaters.

PERFECTION 1135 Ivanhoe Rd., Cleveland 10, Ohio

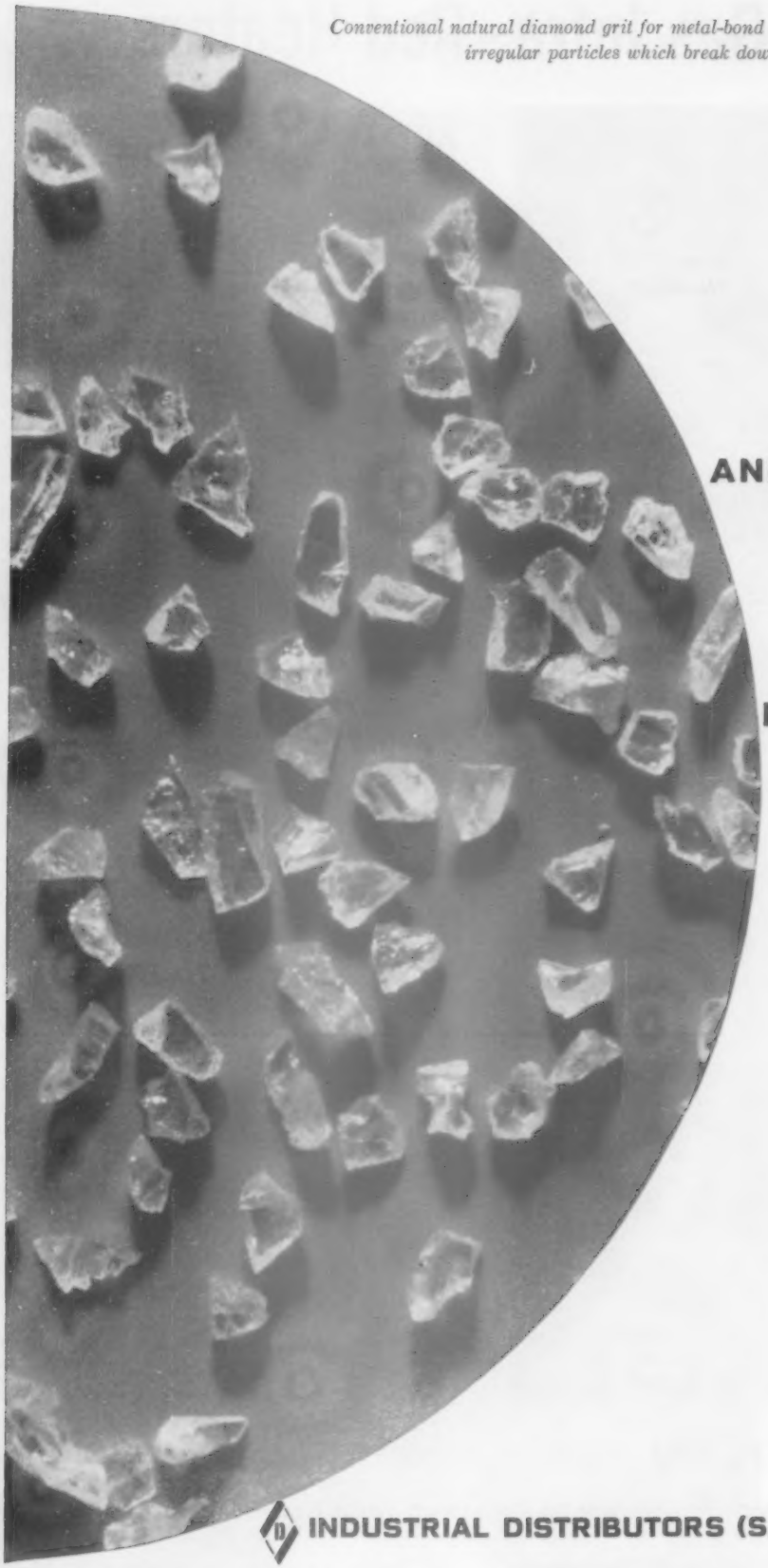
division of **Hupp Corporation** / licensee of **American Infra-Red Radiant Co.**



PIONEERS IN GAS INFRA-RED HEATERS

Under Schwank U.S.Patents 2,775,294 and 2,870,830 and pending applications

Conventional natural diamond grit for metal-bond wheels and saws. Note the friable irregular particles which break down under heavy pressure grinding.



ANNOUNCEMENT:

NEW

NATURAL

DIAMOND GRIT

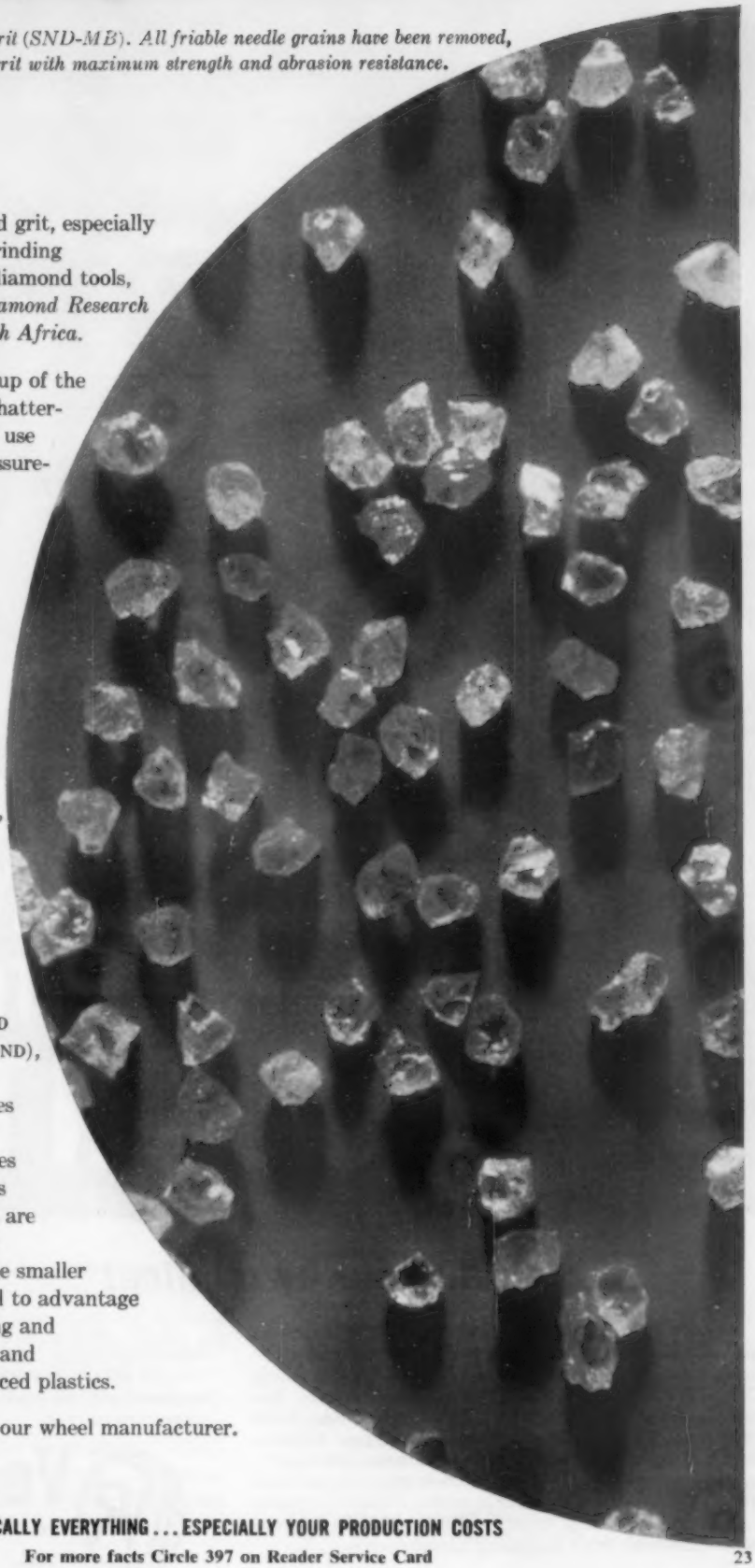
FOR

METAL-BOND

WHEELS

INDUSTRIAL DISTRIBUTORS (SALES), LTD., *London*

New Selected Natural Diamond Grit (SND-MB). All friable needle grains have been removed, leaving only the blocky, cube-like grit with maximum strength and abrasion resistance.



A new type of natural diamond grit, especially suited for use in metal-bond grinding wheels and other metal-bond diamond tools, has been developed at the *Diamond Research Laboratory, Johannesburg, South Africa.*

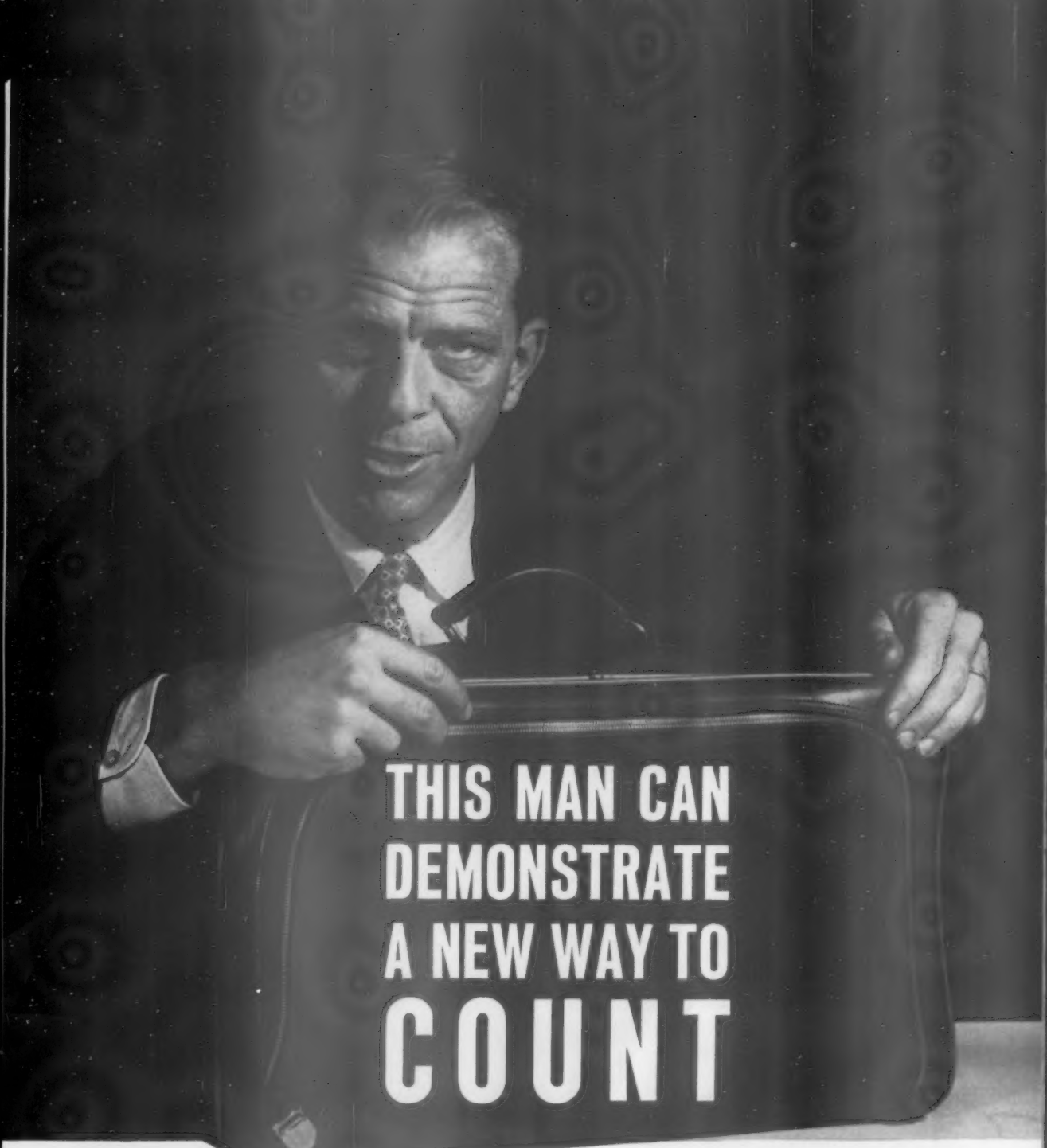
This new natural grit is made up of the strongest, most abrasion and shatter-resistant diamond particles for use in metal matrixes. A new pressure-testing and selecting process removes friable particles from the grit. Thus, the inherent strength of the natural diamond particle is ideally presented for the heavy-duty cutting done with metal-bond wheels and saws.

The new grit has been found stronger than any diamond grit available to date. In tests with concrete, marble, and tile, the new grit permitted a 30 to 50 per cent faster cutting rate than was previously possible. Further tests are under way in actual production set-ups.

Known as SND-MB (SELECTED NATURAL DIAMOND-METAL BOND), the new grit will be offered in a production range of mesh sizes from Tyler screen 16 to 325 mesh at present. The larger sizes will be used in metal-bond saws and thin-wall core drills, which are used in cutting concrete, stone and other rugged materials. The smaller cube-like diamonds will be used to advantage in metal-bond wheels for cutting and grinding of materials like glass and ultra-hard ceramics and reinforced plastics.

SND-MB is now available to your wheel manufacturer. Ask him about it.

INDUSTRIAL DIAMONDS CUT PRACTICALLY EVERYTHING... ESPECIALLY YOUR PRODUCTION COSTS



. . . right in your own office!

Fifteen minutes of your time — that's all it'll take to put on the Veeder-Root "DESK-TOP DEMONSTRATION" — an actual performance of how Veeder-Root Electronic Counters will improve your production records, improve your product. Let us show you how Veeder-Root Electronic Counters can measure quantities, lengths, liquids; count odd-shape objects; actuate machinery; measure batches. Let us show you new counting methods utilizing Electronic Counters to count, measure, actuate — rapidly, accurately, from remote locations, with complete flexibility, with minimum maintenance.

Make sure you see the Veeder-Root "DESK-TOP DEMONSTRATION". Just call your nearby Veeder-Root branch office or write direct. Your Veeder-Root sales engineer will be glad to put on the demonstration at your convenience.

Veeder-Root
ELECTRONIC CONTROLS DIVISION
DANVERS, MASS.
"The Name that Counts"

Hartford, Conn. • New York • Chicago • Los Angeles • San Francisco • Seattle • St. Louis • Greenville, S. C. • Altoona, Pa. • Montreal • Offices and Agents in other principal cities

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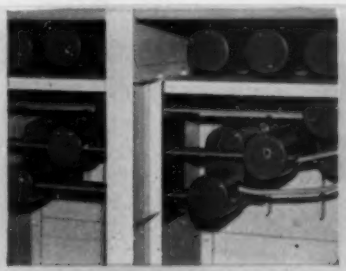
VRD-56

ALLIS-CHALMERS

FIRST static overcurrent relays



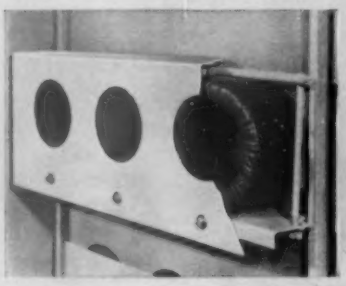
FIRST with track-resistant, glass polyester insulation with primary stud and bus joint

FIRST eye-level instrumentation switchgear

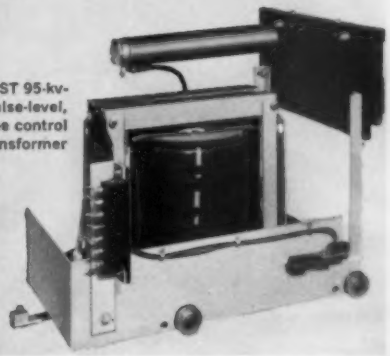
FIRST Aluma-Clad walk-in aisle switchgear

FIRST epoxy-resin potential transformers, trunnion mounted

FIRST front-access current transformers



1ST



FIRST 95-kv-impulse-level, dry-type control power transformer

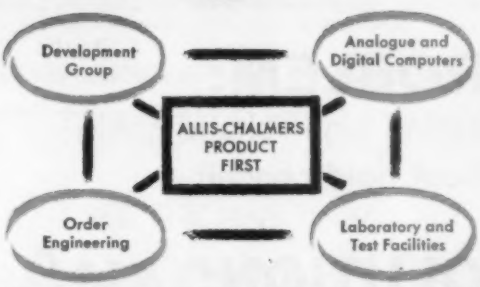
...from the company that put

Progress in Switchgear

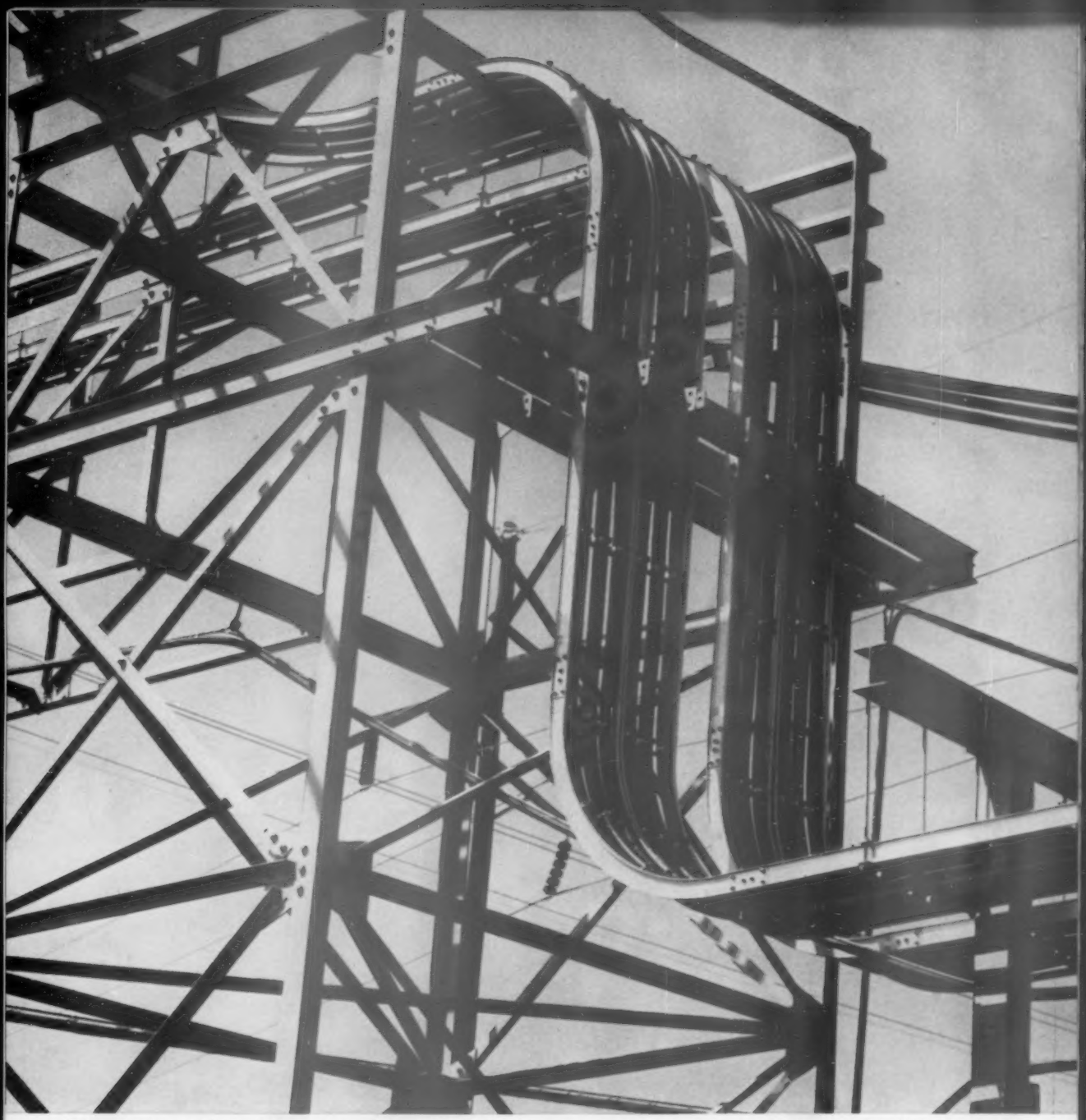
For 113 years Allis-Chalmers has built a reputation for the finest products in the industry. A-C is continuously developing new ideas, new techniques and new products to serve you better. This same leadership spirit has quickened the pace of switchgear progress. It's responsible for the firsts illustrated above. These testify to one company's research and engineering *action*.

There are still better things to come in switchgear. You'll get them all when you specify better switchgear . . . designed, built and *guaranteed* by **Allis-Chalmers,** Power Equipment Division, Milwaukee 1, Wisconsin. A-1357

Aluma-Clad is an Allis-Chalmers trademark.



Intradepartment teamwork bridges all gaps . . . smoothly integrates information, machines and men . . . speeding overall progress in Allis-Chalmers switchgear.



Indoors or out, rugged Anaconda Duralox means fast, easy installation because it needs no rigid conduit. Its reliable Anaconda Butyl (AB) rubber insulation

PROBLEM:

Installing high-voltage cable without rigid conduit

SOLUTION:

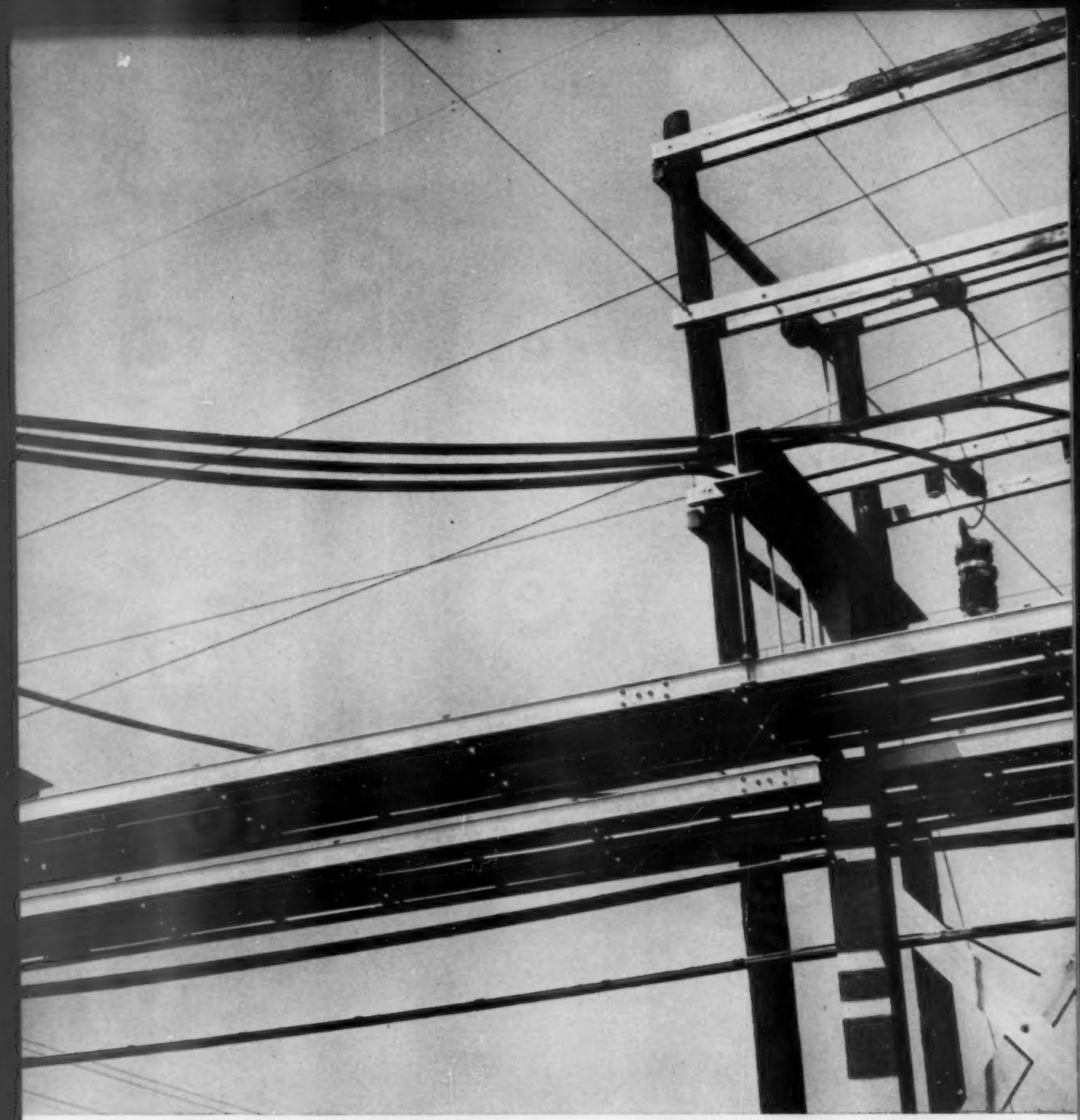
Use Duralox, Anaconda Butyl (AB)-insulated interlocked-armored cable.

You save time . . . you save money . . . you save manpower —with Anaconda butyl-insulated Duralox.* For Duralox has its own conduit of durable, yet flexible, metallic armor.

This means fast and easy installation in long runs over and around obstructions, in trays, indoors or out—and all without the expense, trouble and time of laying rigid conduit and pulling cable through it.

Duralox will fit into your long-range plans as well—because it's 100% salvageable and can be readily moved as your plant layout changes.

Duralox's lower reactance—because of the close spacing of the conductors—results in reduced voltage drop



offers extra protection against ozone and moisture. Above is an installation of Duralox with thermoplastic protective jacket over interlocked armor.

and more efficient power distribution. Available in ratings of 5 kv, 15 kv, and higher, in addition to lower voltage ratings.

Whether your problem is wiring a new plant or rewiring an old one—see the Man from Anaconda. Duralox is just one of the many types of Anaconda wire and cable that can help you increase plant flexibility . . . reduce operating costs . . . bring in new power for your needs today and tomorrow. For full information on Anaconda Duralox Cable write for Bulletin DM-5606 to: Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Reg. U. S. Pat. Off. 8697

DURALOX HAS ANACONDA BUTYL (AB) RUBBER INSULATION FOR

- extra-high resistance against ozone
- exceptional moisture resistance
- 22% more current-carrying capacity than 70° centigrade insulation

SEE THE MAN FROM

ANACONDA®

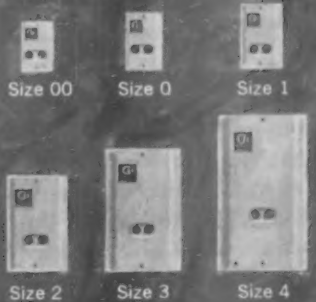
FOR BUTYL-INSULATED
DURALOX POWER CABLE

For more facts Circle 400 on Reader Service Card

Smaller! About 20% smaller than Size 0 Starters. Just 5 3/4" wide, 7" high and 4 3/16" deep.

Convertible! Carried in stock with three cover options or easily converted in field from "reset" only to "start and stop-reset" or "three-position selector switch." Kits at optional cost.

Broad line!



A new addition to the famous three star line

New! Save space and money with Cutler-Hammer's Size 00 A-C Magnetic Starter

Takes up to 20% less space... costs 18% less than Size 0 Starters. Now you get two big new bonuses in control selection . . . less space and less money Both with the all new Size 00 Starter.

Before, you had to use a larger starter in applications where it really wasn't needed. But, now you can use the Size 00 in about 40% of the applications where the Size 0 is usually used.

The new Cutler-Hammer Size 00 Starter performs to the same high standards you get from all Cutler-Hammer Starters. And, you still get vertical, dust-free contacts which add so much to more reliable starter performance. Your choice too, of 2-coil or 3-coil overload protection in the same small enclosure.

The Bulletin 9586 Size 00 Starter can be used on any general application. Its maximum horsepower ratings: Three phase: 208/220 volts, 1½ hp. 440/550 volts, 2 hp. Single phase: 115 volts, ⅓ hp. 230 volts, 1 hp. It's available open or in NEMA 1 enclosure. Send for Pub. LO-40-Q211.

Why you get more from Cutler-Hammer. New things are happening at Cutler-Hammer—new, better products, new engineering ideas and talent, new plant capacity. We're on the move. And, we'd like to show you how we could help you in any electrical control problem. Contact the nearest Cutler-Hammer distributor.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

New Springday V-Belt plant at Springfield, Mo., manufacturing arm of Dayton Industrial Products Co., was designed and built for the single purpose of producing better V-Belts, in quantity.

Here's why Dayton alone can build production V-Belts, in any quantity, with individual custom-built quality

New Springday plant sets higher standards of quality for Dayton V-Belts

Here's real news for you, whether you buy V-Belts for O.E.M. or replacement applications. Dayton's new, completely automated Springday plant eliminates the need for spot-checking production belts, saves you time and money. This is possible because each Dayton V-Belt comes off the line in custom-designed quality at this new plant—the only one of its kind—built specifically and solely for the design and manufacture of V-Belts.

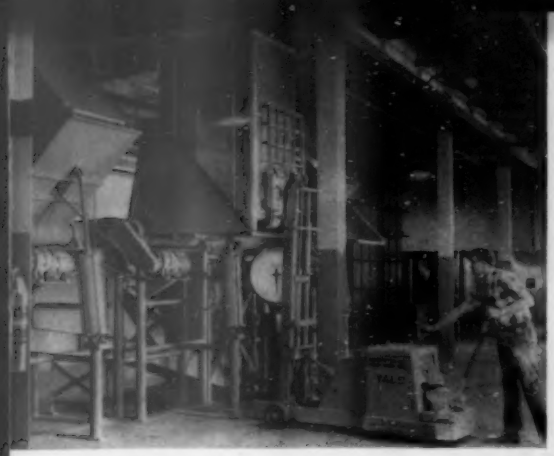
Designed from the "inside-out" by our own Central Engineering staff, this plant incorporates every known, reliable facility for effecting optimum product quality control, efficiency of production and delivery. Where existing machines would not meet the increased standards, new ones were designed, patented and built to do the job.

Recently awarded the distinction of being named by Factory Magazine as one of the Top Ten plants built in 1960, it has been referred to as "a masterpiece of plant layout and material handling . . . quickly became world's largest producer of V-Belts . . . a truly significant plant."

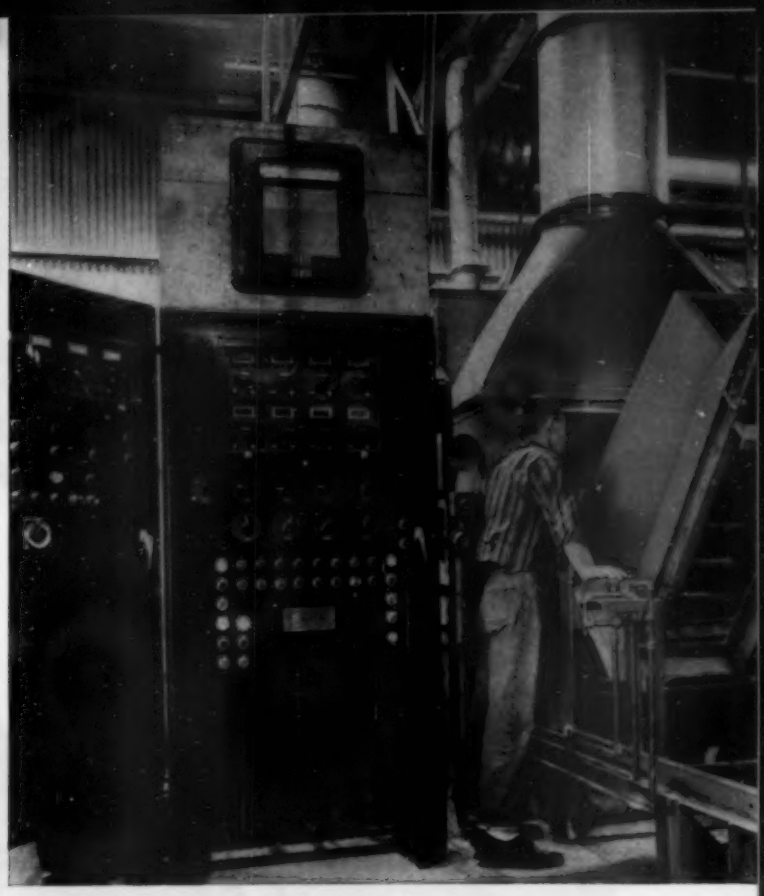
We, too, feel it is a significant plant; principally, however, because it can and is mass producing Dayton Industrial V-Belts to an individual excellence of quality that would not be possible to achieve by a multi-product plant. Here are a few of the reasons why—

Foolproof mixing. Dayton's new monorail unit moves along overhead track as operator weighs out dry ingredients and oils, used to condition rubber stocks, according to exact formula required.

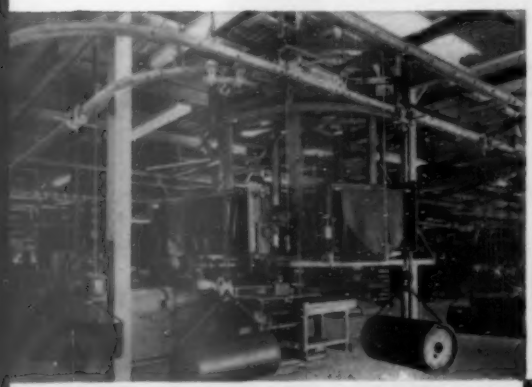
For more facts Circle 402 on Reader Service Card



▲ **Dustless Handling of Carbon Black** is masterpiece of materials handling. Containers are placed in position by fork lift truck; automatically open to add carbon black via auger-type feed, correct amount is measured electronically.



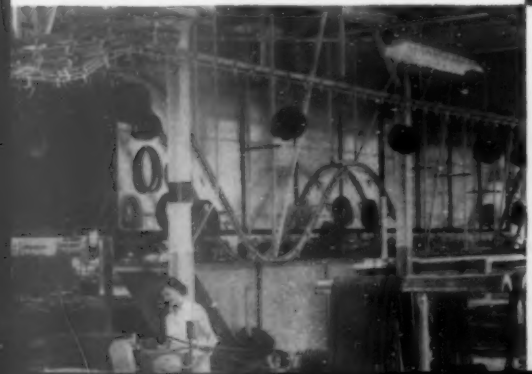
▲ **Automatic loading of new stock** into Banbury Mixer speeds mixing, assures continous flow of stock to collanders. Collanders roll stock to precision thickness for belt making.



▲ **New Multi-station Belt making machine** applies rubber stock in correct ply layers. Belt-making drums are delivered to and removed from machine by continuous overhead conveyor.

Many patented and exclusive innovations and improvements in belt building assure optimum production and quality control. This rotating Carousel provides operator with 6 different types of ply stock at the touch of a pedal. ▶

Final check "sag" test. Each belt receives Dayton's special "sag" test to insure proper belt matching. In background, uncured belts are carried by conveyors ▼ to curing room.



Dayco

INDUSTRIAL DEPARTMENT

Dayton Industrial Products Co.

A Division of Dayco Corporation (formerly Dayton Rubber)

2001 Janice Ave., Melrose Park, Ill.

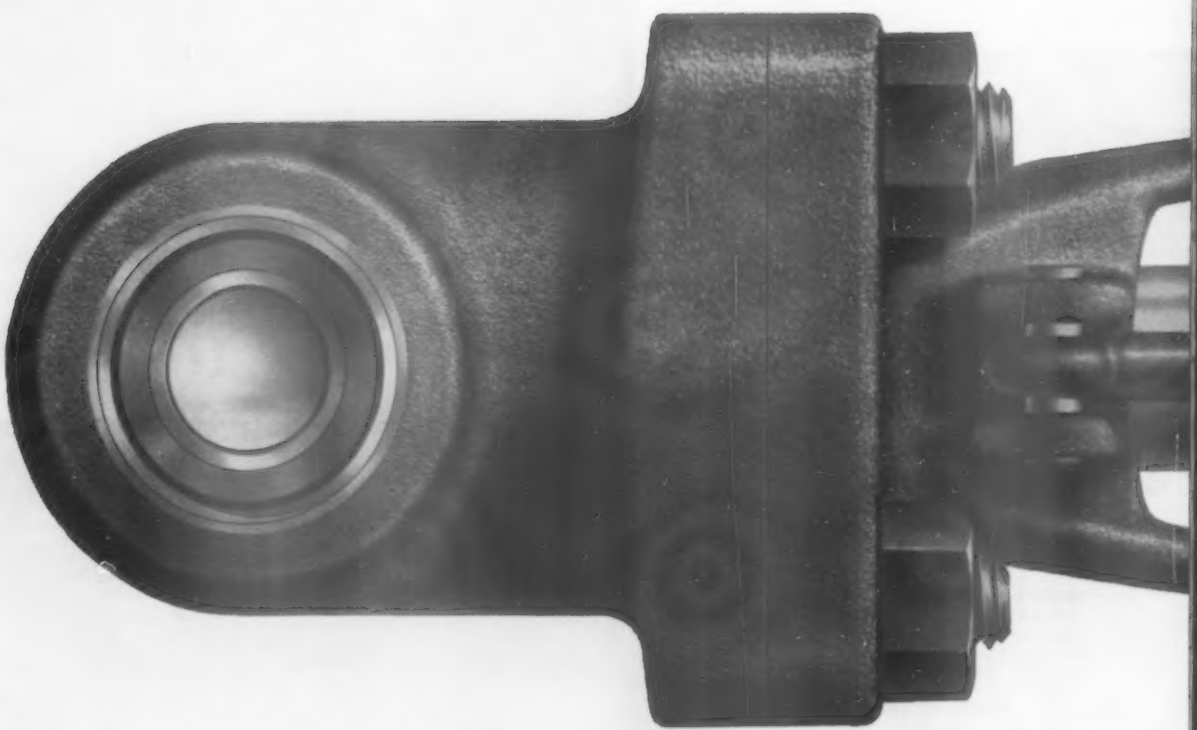
Telephone: ESterbrook 9-5700 regarding specific questions, or see the Yellow Pages for your nearest Dayton Distributor.

Reporting more news from . . .

CRANE DIRECTION '70

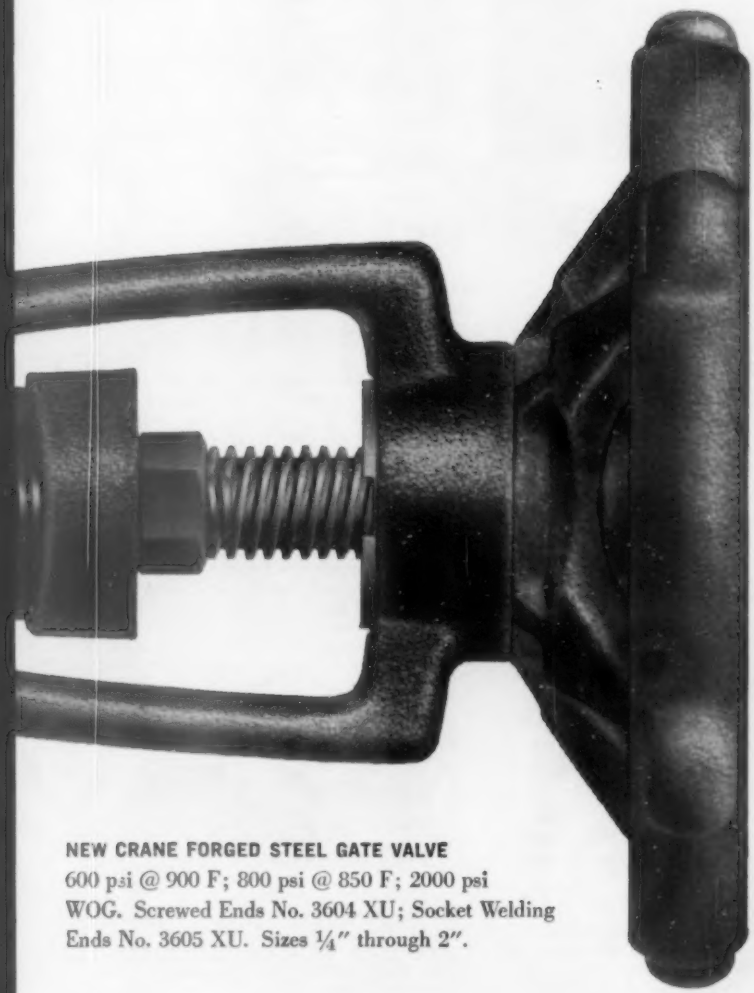
. . . a fast-moving program of planned expansion, product development, and streamlined distribution to help our customers meet the competitive challenges of the Sixties.

COMPLETELY



REDESIGNED!

THE NEW SMALL FORGED STEEL GATE VALVE



NEW CRANE FORGED STEEL GATE VALVE
600 psi @ 900 F; 800 psi @ 850 F; 2000 psi WOG. Screwed Ends No. 3604 XU; Socket Welding Ends No. 3605 XU. Sizes ¼" through 2".

This is a whole new valve, not just one with a new feature added. This redesign incorporates all the features you told us you wanted plus a few others we know will make this valve a better buy in terms of longer service life, less maintenance, easier and faster servicing.

Like the new "bow-leg" yoke, which for the first time gives you plenty of hand room for easy stuffing box maintenance. And like the long-life braided asbestos packing, with Inconel wire insert. The "universal" trim that can be used for either oil or steam, eliminating many of your stocking problems. The spiral wound stainless steel bonnet gasket with asbestos filler, made blowout-proof with a male-female joint.

But what we really want you to remember, more than any single feature, is that this Crane valve is the newest—all new—valve on the market . . . well worth considering when you need small, high-pressure steel gate valves. We'd like you to compare this new valve with any other comparable valve feature for feature.

Your local Crane distributor has technical literature and a complete selection of these valves right in stock. Call him on small steel gates. In fact, he's your best bet to call no matter what valve you want because he carries the broadest line of quality valves in the world.

CRANE®

CRANE CO., INDUSTRIAL PRODUCTS GROUP
4100 S. KEDZIE AVE. • CHICAGO 32, ILL.
VALVES • ELECTRONIC CONTROLS • PIPING
PLUMBING • HEATING • AIR CONDITIONING

For more facts Circle 403 on Reader Service Card

Tuffy has the right answers for every sling need

These three shots of Tuffy slings at work just begin to suggest the thousands of different jobs Tuffy does in hundreds of industries.

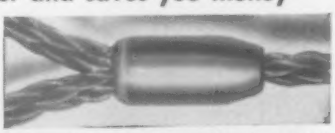
Tuffy slings, hoist lines and special-purpose wire ropes are tailored to every type use, every weight and shape of load, every set of working conditions.

How well do they do the job? Quoting a steel company official: "We are getting double the service life from our 1¼" 9-part machine braided Tuffy slings as we did from 6 x 37 rope type slings."

That's typical of many testimonials that praise Tuffy's combination of better performance, greater safety and longer service life you get from Tuffy products.

Why Tuffy serves you better and saves you money

Tuffy's Exclusive Fabric combines extra strength and extra flexibility to give you ultimate sling construction. It makes knotting and kinking next to impossible. If a kink should occur, it's easily smoothed out, leaving no permanent damage.



Pressed-On Streamlined Metal Ferrule gives the tucked eye splice 100% of fabric strength. It's applied under tremendous hydraulic pressure. Streamlining eliminates snags and projections that might injure hands or arms.

Get in Touch with Your Tuffy Distributor

Whether your sling jobs call for machine-braided Tuffy slings or the new line of Union 6- and 8-part hand-braided slings, your Tuffy distributor can supply all your needs. His experience (and the counseling service of Union's branch office or factory staff) are yours to call on at any time. Look up your Tuffy distributor in the Yellow Pages.

Tuffy® Tips —on safe use of Slings and Hoist Lines

How Much Lifting Should Be Done by Muscles?

Individual differences between workers make this a hard question to answer categorically. For a rule of thumb: United States Department of Labor recommends men should handle no more than 50 pounds; women no more than 25 pounds. Of course this is for men and women of average size and height, in normally good physical condition. To remove all doubt, mechanical lifting and hoisting equipment should be used for all loads not comfortably lifted by muscles.

Use the Right Fittings

Proper fittings can give slings added safety and service life. The sling eye is usually the point of greatest wear in load handling. The proper fitting acts as a shield to take the brunt of this wear. Shown above are some of the standard and advance type fittings. Left to right: (1) *Equalizing Thimble* permits adjustment of the sling leg lengths so irregular loads may be handled on an even keel. (2) *Newco Sling Bridle* will not slip when handling unbalanced loads. (3) *Newco Slip-Thru Thimble* allows passage of an identical thimble through its eye when a regular sling is used as a choker sling. (4) *Newco Slip-On Thimble* eliminates flattening or pulling together of eyes under heavy loads; can be attached or removed in seconds.

FREE!
New Tuffy Sling Handbook

All about slings from A to Z, including types, dimensions and rated loads. Address **Union Wire Rope Corporation, 2234 Manchester Ave., Kansas City 26, Missouri.** Specialists in high carbon wire, wire rope, braided wire fabric, and stress relieved wire and strand.

4

UNION Wire Rope

Subsidiary of ARMCO STEEL CORPORATION

OTHER SUBSIDIARIES AND DIVISIONS: Armco Division • Sheffield Division • The National Supply Company
Armco Drainage & Metal Products, Inc. • The Armco International Corporation • Southwest Steel Products

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TORQUE · PERFORMANCE · DEPENDABILITY

BUY A... SIOUX

AIR or ELECTRIC

IMPACT WRENCH

Air impact wrenches deliver

up to 15% more torque

while consuming 30% less air!

NO. 322

Superiority of their mechanical design is revealed in the unusual efficiency of SIOUX Air Impact Wrenches. Wrench for wrench, model for model, size for size, SIOUX can be counted upon to deliver an average of 15% more torque, while consuming 30% less air! Less power is absorbed by the wrench itself. More is applied to the drive. Three SIOUX wrenches can be operated on the existing air supply for every two of another kind. This correctness of engineering design has also produced a wrench of superior endurance, longevity, and freedom from trouble. Low first cost, higher torque, lower air consumption and long trouble-free life add up to make SIOUX THE BIG BUY IN AIR IMPACT WRENCHES!

No guess work with.... CERTIFIED SIOUX POWER

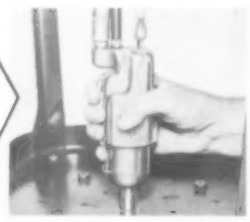
When it's a SIOUX, you know what it will do! SIOUX tells you the torque your air or electric impact wrench will deliver. You don't buy just a wrench. You buy certified SIOUX power, reversible power, and on air wrenches controllable power through eight point power selector.

REACTION BALANCED for Less Vibration Feed Back

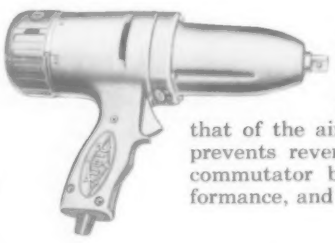
All SIOUX Impact Wrenches are "reaction balanced" for less vibration and torque feedback and for minimum operator fatigue. There's less shock and twist when the wrench impacts. You can feel the difference!

A SIZE FOR EVERY NEED!

From the big No. 322 SIOUX Air Impact Wrench (upper left) capable of up to 1,000 foot pounds of torque at 90 pounds of air pressure, to the little No. 313 (pictured at right) which weighs 2½ pounds and can deliver up to 80 foot pounds of torque, there's a full range of SIOUX impact wrench sizes and models.



SIOUX Electric IMPACT WRENCHES



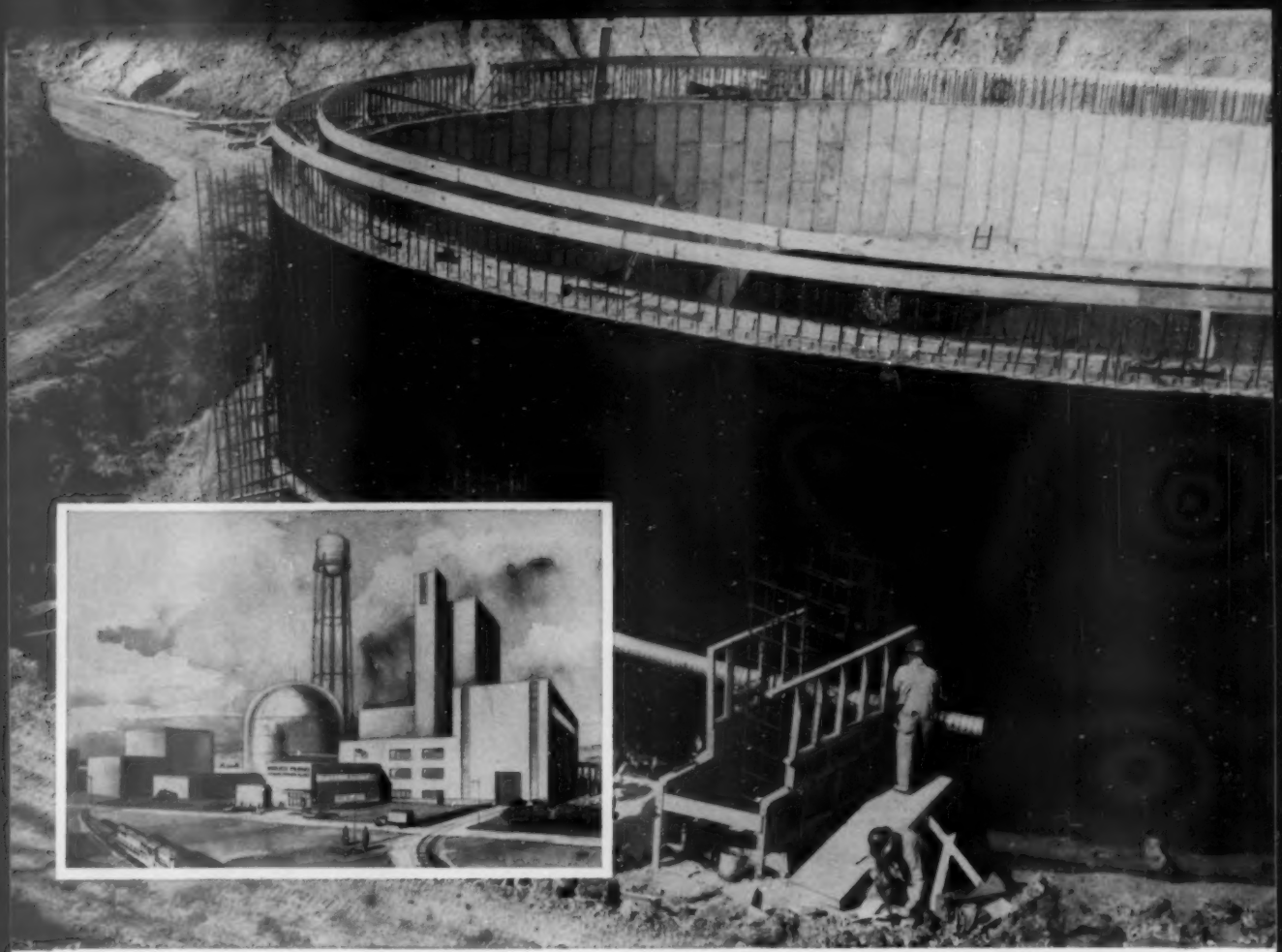
SIOUX Electric Impact Wrenches offer equal power in right or left hand rotation. The torque for each wrench is stated and certified. Their mechanical design offers exactly the same advantages as that of the air wrenches. Their exclusive reverse cap switch lock prevents reversing with the current on, and eliminates burning commutator brushes and switch contacts. Their efficiency, performance, and freedom from trouble are unexcelled.

Look under **"TOOLS, ELECTRIC"** *in the Yellow Pages*

ALBERTSON & CO., INC.

SIOUX CITY, IOWA • U.S.A.

AIR IMPACT WRENCHES • AIR SCREWDRIVERS • ELECTRIC IMPACT WRENCHES • ELECTRIC SCREWDRIVERS • DRILLS • GRINDERS • SANDERS • POLISHERS • FLEXIBLE SHAFTS • PORTABLE SAWS • VALVE GRINDING MACHINES • ABRASIVE DISCS



Bitumastic No. 50 waterproofs and protects concrete foundations at atomic power plant

When actual construction was begun in 1956 on the nation's largest "breeder type" atomic reactor and generating station—the 100,000-kw Enrico Fermi Atomic Power Plant—Bitumastic® No. 50 was called for in the plans for most below-grade concrete surfaces.

Nearly 40% of the 915-acre atomic power plant site at Monroe, Michigan, was originally marsh land or entirely submerged before a gigantic filling operation was undertaken. This subsurface condition made damp-proofing of reinforced concrete foundations—particularly of the reactor building, shown under construction, above—an important design consideration. Bitumastic No. 50, well-known for its resistance to water penetration, was applied in two coatings to all concrete foundations.

Bitumastic coatings have been performance-proven on many industrial installations where protection against water absorption, salts and industrial contamination which cause corrosion are essential. There is a Bitumastic coal-tar based coating for every industrial coating application. For more information on how the Bitumastic coating systems can benefit you, mail the coupon or write: Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa. District Offices: Boston, Chicago, Los Angeles, Pittsburgh, New York and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto, Ontario.

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KOPPERS
BITUMASTIC
COATINGS & ENAMELS
another fine product of COAL TAR

Koppers Company, Inc., Tar Products Division
Dept. 135H, Pittsburgh 19, Pa.

Gentlemen:
Yes, I'd like to know more about Bitumastic Coatings for Corrosion Prevention.

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

WESTINGHOUSE PROGRESSIVE

WESTINGHOUSE
PROGRESSIVE AUTOMATION
CAN HELP YOU IMPROVE
OUTPUT, PROFITS
THROUGH COORDINATED
AUTOMATIC PRODUCTION

AUTOMATION

Westinghouse *Progressive Automation* is a long-term plan leading to automated production with minimum capitalization. It is designed to help manufacturers gain better product quality through step-by-step control of operations.

In fact, *Progressive Automation* has already been carried to its logical conclusion: completely automatic production. In the steel industry alone, three computer-controlled systems have been sold. Here the entire drive systems, supplied by Westinghouse, provide coordination of rolling mill operations under the command of a computer.

AUTOMATION... STEP BY STEP—Westinghouse is ready to work with you in planning economical steps to automatic operations . . . without under- or over-automating. Step-by-step automation starts with the many modern Westinghouse controls, motors and drives at work in plants today. Each was designed to achieve an immediate production objective . . . to control a single machine, a conveyor line or an entire installation. Through *Progressive Automation*, you next add other Westinghouse coordinating controls and systems—all of which are compatible with those already in place. Your eventual target may be all production facilities fully coordinated with the Westinghouse industrial control computer.

PROGRESSIVE AUTOMATION ALREADY AT WORK—*In the paper industry*, PULSETTER* makes possible new standards of accuracy and product quality in paper production. The PULSETTER control system uses digital circuitry to maintain accurate synchronization of the speed *and* position of all sections of a paper machine. Accuracies can be maintained to only a 5″ variation in 2000 feet of paper.

In the chemical processing industries, Westinghouse provides OPCON* which experiments, then finds and controls optimum production efficiency.

For the primary metals industry, installations of Westinghouse PRODAC* (programmed digital automatic control) have improved product quality and mill functions, as well as monitoring all phases of the product and process by data accumulation systems.

For the first time, there is now one source for all your automation needs: Westinghouse computers, controls, drive systems, transformers, motors, gearing, switchgear . . . and Westinghouse assumes full electrical system responsibility.

Call on Westinghouse and detail your objectives. We are prepared to work out your automation plan . . . furnish, install and maintain the necessary electrical equipment. Your Westinghouse representative has complete details on *Progressive Automation*.

*Trade-Marks

J-96144

PRODAC control computers are designed to work in unison with conventional control equipment. Result: full automation of plant or process becomes a practical reality.

YOU CAN BE SURE... IF IT'S Westinghouse

Cedarapids Super Commander Portable Crushing and Screening Plant, built by Iowa Manufacturing Company, Cedar Rapids, Iowa, produces up to 500 tons per hour of crushed and screened material in four different product sizes.

This high capacity V-Belt Drive handles

60% more power in 30% less space!

Higher Capacity of Gates Super HC V-Belt Drives solves complex product-development problem!

In developing a larger crusher, requiring more horsepower, Iowa Manufacturing Company was faced with the problem of transmitting 400 hp from a higher-speed engine in a space that had been just enough for conventional V-belts carrying 250 hp.

At the higher speeds, centrifugal force made it impossible to go to larger sheave diameters to accommodate larger belt sections. A wider span of belts was ruled out by Highway Department requirements, which restricted overall machine width to eight feet.

Iowa Manufacturing's designers solved their primary problem of transmitting 60% more horsepower with new Gates Super HC V-Belts.

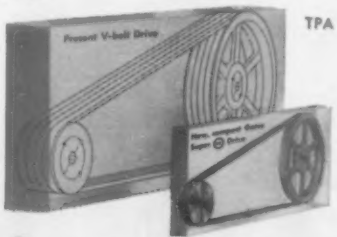
Because Super HC V-Belts have smaller cross section, use narrower and lighter-weight sheaves, pack higher hp capacity in a smaller 'package' than conventional V-belts, designers also succeeded in reducing drive weight, width and height — a decided bonus in equipment that must be moved frequently both on and off the highway.

Nation-Wide Engineering Service

There's a Gates Distributor nearby to show you how to reduce drive weight, space and cost with Super HC V-Belt Drives. With Super HC, sheave diameters can be reduced 30% to 50%, drive space up to 50%, and drive weight 20% or even more.

Ask your Gates Representative for your free copy of "The Modern Way to Design Multiple V-Belt Drives," or write to The Gates Rubber Company Sales Division, Inc., Denver, Colorado.

TPA 503A



The Gates Rubber Company, Denver, Colorado

Gates Rubber of Canada Ltd., Brantford, Ontario

Gates *World's Largest Maker of V-Belts*

Gates Super HC V-Belt Drives

same hp capacity in smaller "package"

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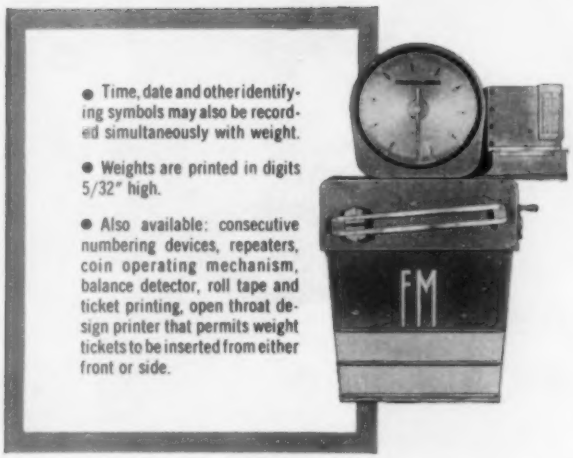
NOW... an accurate printed record of everything you weigh Automatically!



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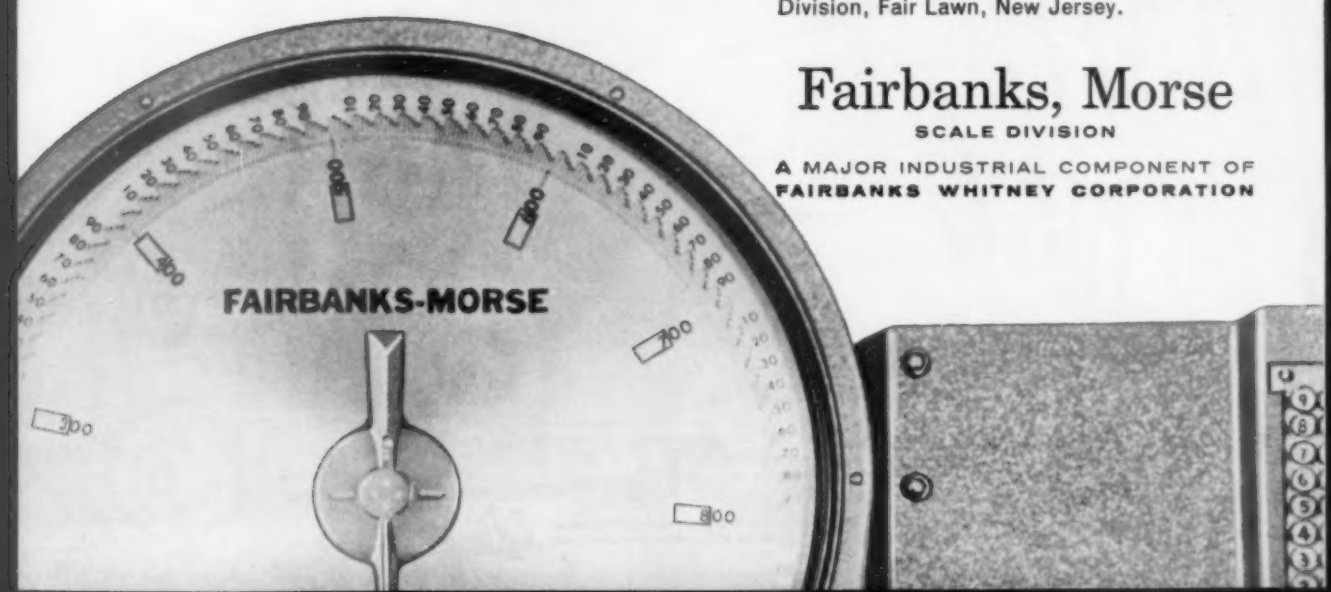
THE VERSATILE ATTACHMENT that fits any F-M Floaxial Dial Scale to provide you with accurate permanent printed records. Completely eliminates the possibility of human errors in weighing operations; does away with costly disputes between buyer and seller, weighman and trucker. Instead, you get *truly automatic weighing* . . . the Floaxial Dial Scale plus Printomatic accurately record correct weights on tickets, roll tape or both!

WAREHOUSES *find Printomatic valuable in effective cost control. Printomatic furnishes a printed, permanent record of every shipment entering the warehouse—an effective check on the cost of raw materials.*

INDUSTRIAL OPERATIONS *often include Printomatic* directly on the assembly line *to accurately weigh and tag products and product parts.*

F-M Printomatic Weigher makes the printing of weight figures a simple matter—no matter what the application! Check these dependable Fairbanks-Morse Printomatic features.

Learn how truly automatic weighing, the Fairbanks-Morse Printomatic way, can make your operations more efficient, more profitable. Write to Fairbanks, Morse & Co., Scale Division, Fair Lawn, New Jersey.



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Buffalo air handling equipment to move, heat, cool, dehumidify and clean air and other gases.

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Squier machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

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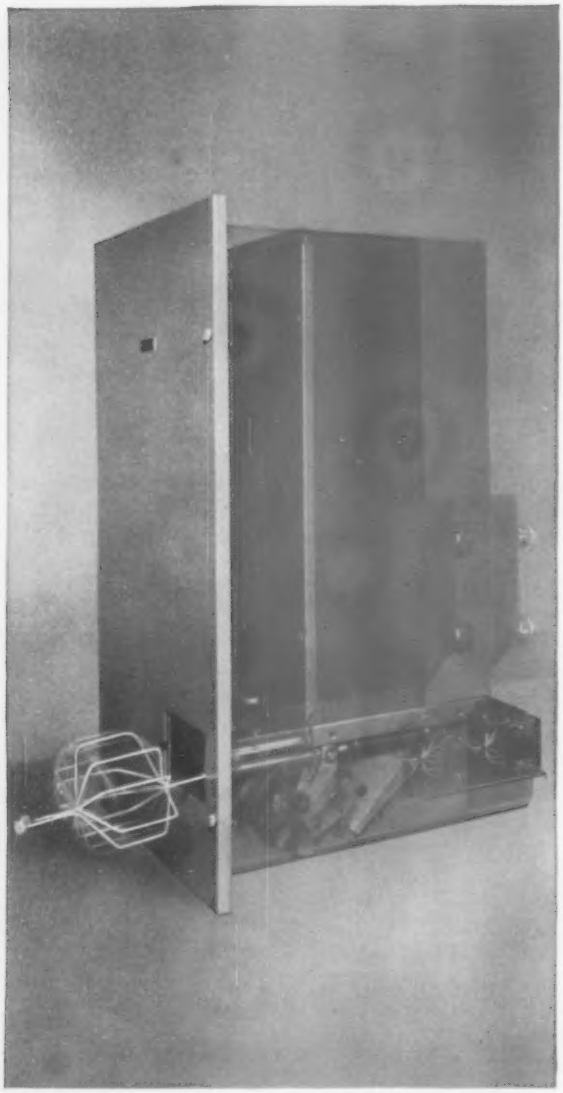
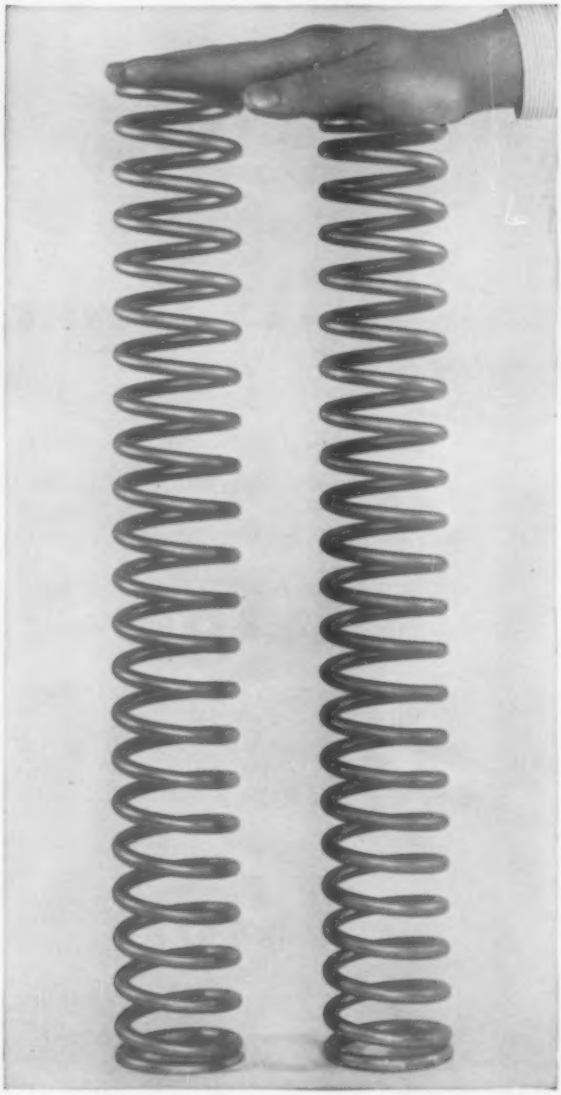
Has closed-door drawout...



Stored energy as standard...



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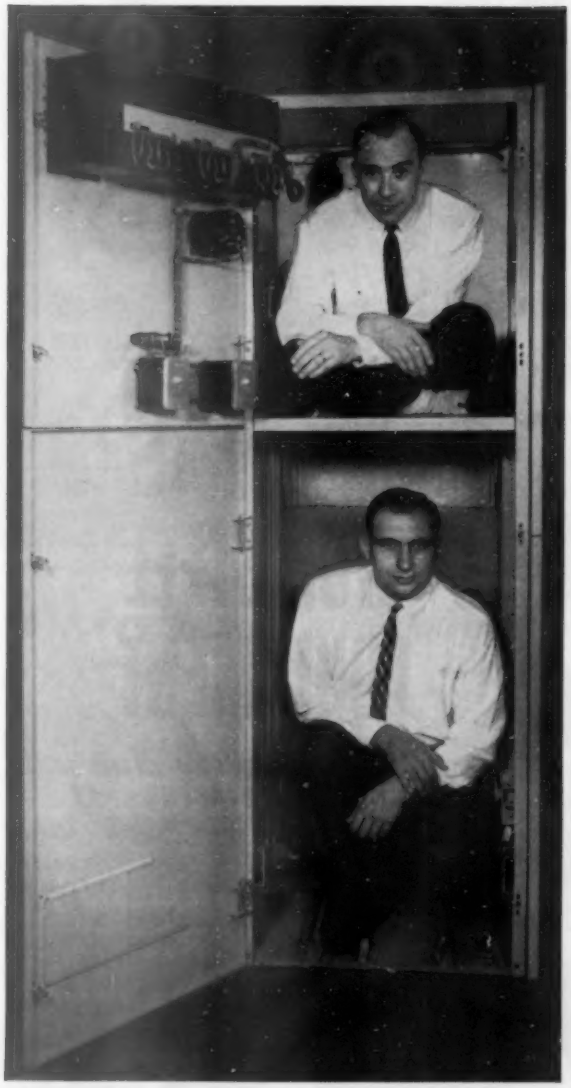

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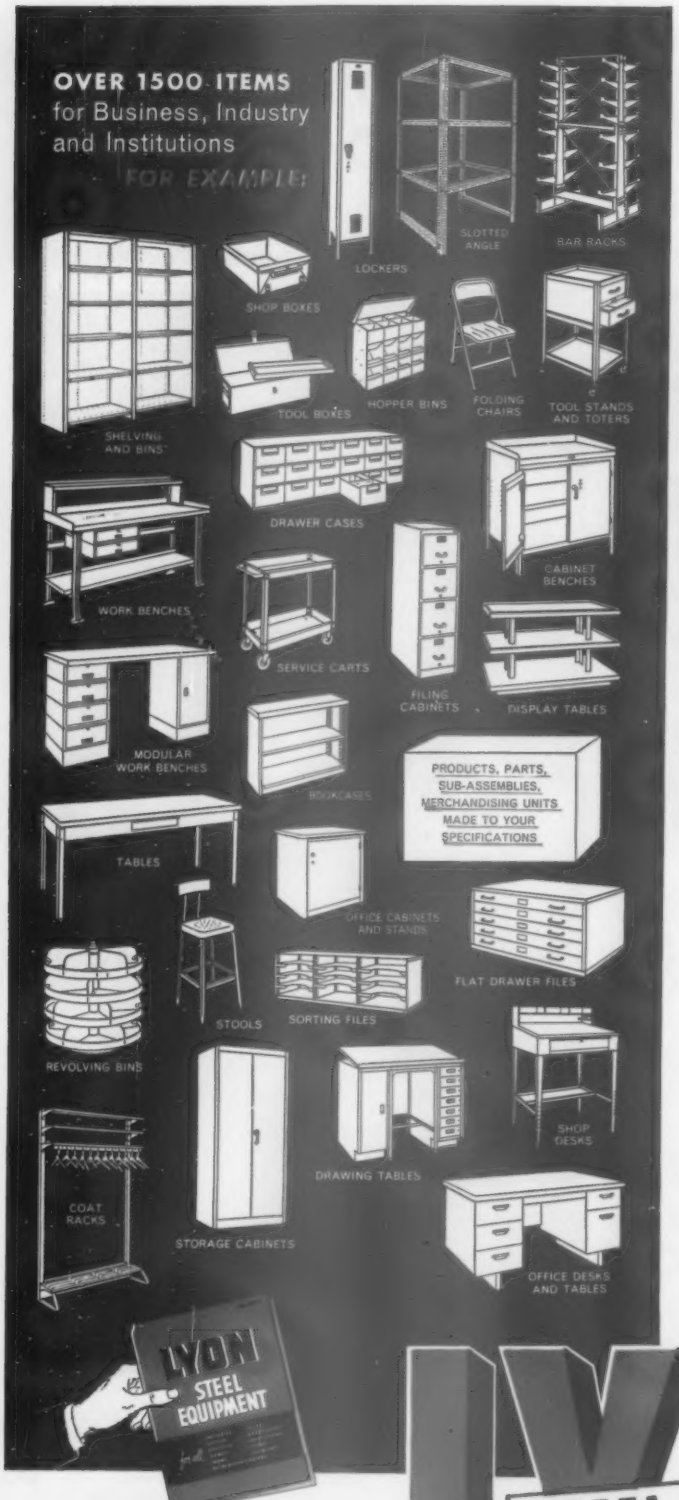

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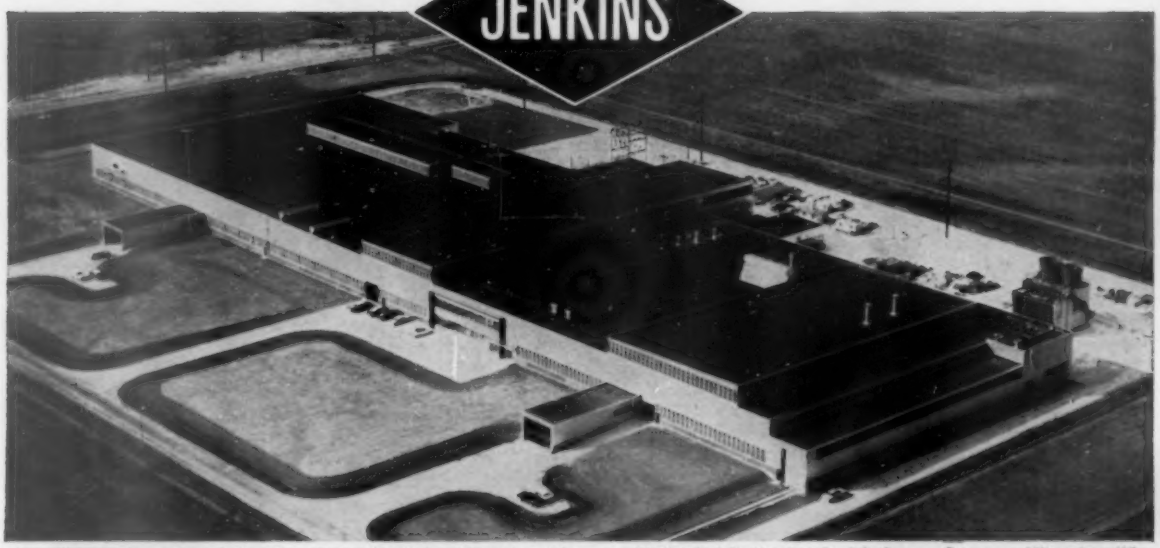
Two Famous Marks of Quality Get Together

NEW MIRRO ALUMINUM ROLLING MILL

JENKINS



Consulting Engineers and Contractors: Klug & Smith Co., Milwaukee, Wis. • **Mechanical Contractor:** Paul S. Grunau Company, Milwaukee, Wis.

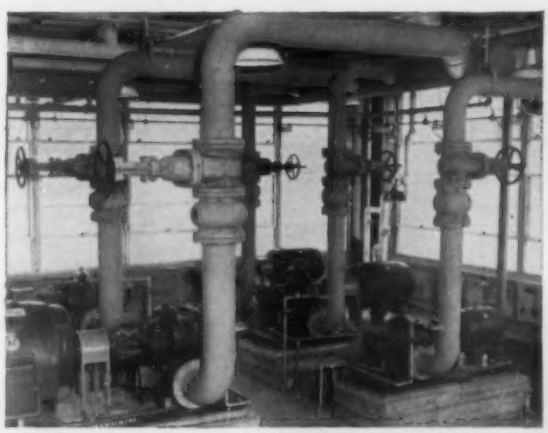
To control its 15 miles of piping Mirro chose JENKINS VALVES

With a trademark that promises the finest aluminum products, Mirro Aluminum Co. wanted the most trusted trademark in the valve world as an assurance of reliability for the complex piping system in its new $12,000,000 rolling mill in Manitowoc, Wisconsin.

There are over 15 miles of piping in this huge new mill that can produce 60,000,000 pounds of aluminum foil and sheets a year. But there will be no valve problems . . . no avoidable valve maintenance and replacement expense on these lines. Mirro made sure of that by installing Jenkins Valves throughout the system.

There's no point in gambling with valve problems when you can have the known reliability and trouble-saving quality of Jenkins Valves, without paying extra for the protection. Jenkins Bros., 100 Park Avenue, New York 17.

Sold Through Leading Distributors Everywhere



Jenkins Bronze and Iron Valves on lines in pump house for water cooling tower

JENKINS

LOOK FOR THE JENKINS DIAMOND

VALVES

JENKINS SINCE 1864 Jenkins Bros

CORROSION meets its match in Alcoa aluminum conduit

Here's an electrical rigid conduit that you can install and forget.

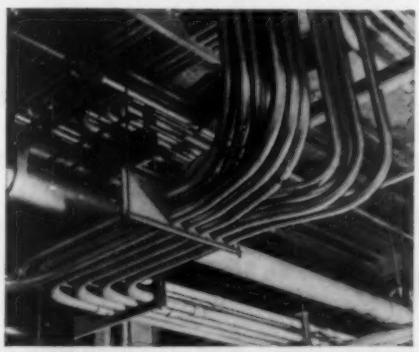
Alcoa aluminum conduit solves most corrosion problems in and around chemical plants.

Aluminum protects itself Unlike other conduits, which require some kind of coating, aluminum forms its own protective film. This film forms naturally in the atmosphere and in the presence of oxidizing agents. Damaged spots are self-repairing—almost instantly! The natural oxide coating on aluminum takes the place of factory coatings on conventional conduits and only under unusual conditions is any other protection required.

Other advantages Corrosion resistance is just one good reason for selecting aluminum conduit. Its light weight (about ⅓ as much as steel) makes it easier to handle and install. Alcoa aluminum conduit is also nonmagnetic and non-sparking.

How about cost? Consider initial cost, savings in installation and maintenance, and service life. You'll see that Alcoa aluminum electrical rigid conduit stacks up as a sound investment.

More information For specifications, or answers to specific questions about the use of aluminum conduit in corrosive environments, contact one of our nearby representatives. Or write to Rome Cable Division of Alcoa, Dept. 21-80, Rome, New York.



NO CORROSION despite moisture, chemicals and vapors in the basement of this sewage disposal plant in Cleveland. Installed in 1932, this Alcoa conduit still looks almost like new.

ROME CABLE
DIVISION OF **ALCOA**

Air operates this folding machine to provide the neatly folded, factory-fresh shirts found in popular shirt stores. In the background, left, is an air- and steam-operated pressing machine that furnishes smoothly pressed shirts in seconds.

Compact 25S2 distributes air through 2-inch air-mains and laterals to individual machines. Mr. Hopper, (at right), expects "many years of trouble-free service from the Model 25S2 compressor."

Van Heusen "cuts operator fatigue— ups output per machine by 10% to 20%" with a

LE ROI 25-HP STATIONARY COMPRESSOR

Shirt-making is exacting work. It's so tiring that an operator's output can drop 40% in five hours. To reduce fatigue and to maintain efficiency, "we prefer air control for the more delicate operations of sewing and trimming machines, laundry, pressing and creasing work," reports Charles G. Hopper, assistant to the production manager of the Pottsville (Pa.) plant of Phillips-Van Heusen Corp.

At least some of the credit for reducing fatigue and increasing production is given to the 25 horsepower Le Roi compressor which provides air-power in their shirt factory.

The 105 cfm, 125 psi capacity of the Le Roi 25S2 air-cooled compressor more than meets current needs, and provides for the addition of more air-operated machines. Mr. Hopper states that the unit operates 10 hours a day, five and one-half days a week. To assure dependable air supply, valves of the 25S2 are inspected weekly, and oil is changed every 200 hours.

Why don't you check the benefits of pneumatic operation? Le Roi can meet your needs with Westinghouse unit-type and Le Roi stationary air compressors from ½ to 100 hp. See your Le Roi distributor for more information. Or write to Le Roi Division, Westinghouse Air Brake Co., Milwaukee 1, Wisconsin.

LE ROI STATIONARY COMPRESSORS

SC-09

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Hoover is first to seal ball bearings with TEFLON! Hoover makes *sure* that lube stays in, dirt stays away from the smooth, mirror-like working surfaces of high quality *Micro-Velvet* Lapped Balls and *Hoover Honed* Raceways. You get greatly extended bearing life.

Why TEFLON for seals? TEFLON is the remarkable new product of chemistry . . . extra tough . . . extra long wearing . . . and so slippery that there is practically no torque resistance. Hoover seals are ingeniously engineered to maintain positive contact and improve lube circulation. Permanently attached full metal shields lock the seals within the bearing, safe from damage.

Use Hoover Ball Bearings with single or double seals of TEFLON for high speed applications, electric motors, or whereever periodic lubrication or maintenance is not practical, as in sealed units. They are available in extra light, light and medium series.

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(light, medium, heavy series)

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- Single Row Radial
- Combination Felt Seal and Shield
- Double Row
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RAPISTAN Ideas HANDLING

HOW MANY HOURS MAKE A WAREHOUSE?

Unlike theoretical scientists contemplating the fourth dimension, materials handling engineers have a very practical concern with the element of time. In warehousing situations, for example, "how long" is a vital consideration, along with "where", "how much", and "when".

How long must goods remain at rest before they constitute a warehousing problem? An hour, a day, a week, a month? There is no universal answer. In modern and efficient handling systems, where warehousing operations are closely coordinated with other phases of the flow system, a true warehousing problem can result from materials being stopped or stored a few minutes as well as a matter of weeks. And, since such short-term stop-overs usually involve frequent rehandling, rapid turn-over can be a more costly problem than long-term storage would be.

It's paradoxes like this that send materials handling managers to their nearest Rapistan engineer for practical ideas on solving their in-plant warehousing problems. Rapistan has evolved some interesting new concepts of long and short-term accumulation. And, Rapistan makes what it takes to put these storage problems "on wheels", where they're handled with the same efficiency you demand in the planned movement of goods over your flow system. The problems may be solved by a special-design Flow Rack for live storage, or something as familiar as a standardized type of wheel or roller conveyor, or a creative application of overhead trolley conveyor, or something as new as our APC "Pressure-sensing" conveyor.

Why not call in your Rapistan handling engineer and let him go "warehouse hunting" with you in your plant. He's trained to spot these "hidden" warehousing problems wherever they may occur in a plant's operations. And he's had worlds of experience in turning these problems into profits for all kinds of manufacturers as well as wholesalers and retailers. We'll show you some examples, in illustrated case studies. Just **call on your Rapistan engineer.**

DOZENS OF HANDLING PROBLEMS SOLVED

by imaginative use of power and gravity conveyor and improved methods of storage, are illustrated in this newly-revised Handbook of Materials Handling Ideas.

RAPISTAN FLOW RACK SOLVES a localized warehousing problem in this plant. An optimum supply of all parts needed in this assembly area are held in live storage, easily accessible to the worker. As parts are removed from the Flow Rack, others flow forward to take their place.

R-K POWER-AND-FREE CONVEYOR KEEPS WAREHOUSED GOODS MOVING

Warehousing problems frequently occur following manufacturing operations, such as this sewing department in a large women's wear plant. Not here, however. Rapistan-Keystone overhead conveyor takes the finished goods directly from sewers to packers, via a power-and-free trolley system. No problem of finished goods accumulation, no floor traffic, no manual movement. Costs go down, as combined storage and transportation goes up on R-K conveyor.

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The RAPIDS-STANDARD CO., Inc.
693 Rapistan Building, Grand Rapids 2, Michigan

FACTORY PRESS TIME REPORT • AUGUST 1960

Looking Ahead in Business

Don't rule out the probability of further gains in business during the remaining months of 1960—despite the not-so-exhilarating business news in recent weeks.

But keep in mind that this is really the off-season so far as many industries are concerned. This accounts, in part, for some of the sluggishness reflected in recent official statistics.

•

True, industrial production did slip during June. The Federal Reserve Board's seasonally adjusted Index of Industrial Production dropped to 109 (1957 = 100) from the 110 mark set in the preceding month. Thus, total industrial production in June was a shade below the June 1959 level.

Most of this slippage in production was a reflection of further cutbacks in steel output—cutbacks that had the industry operating at less than 50% of capacity for most of the month.

Fortunately, some relief is destined before long for the stumbling steel industry. For one thing, auto producers will begin to step up ordering as we move into a new model year. And, in addition, a likely build-up in industrial and highway construction should boost steel demand.

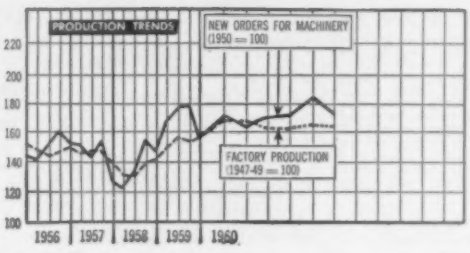
But don't expect a fast and complete recovery in steel. Remember that the popularity of compact cars —plus the successful introduction of an aluminum engine—has taken a bite out of the steel market.

•

Statistics on the behavior of the Gross National Product during the second quarter of the year are a bit more encouraging. GNP during the second three months of 1960 edged up to $504-billion on an annual rate basis, a $3-billion increase over the first quarter level. Stacked up against the sizable gain registered in the first quarter, however, this latest increase in GNP isn't as impressive as it appears.

Also encouraging is the continued creep upward of business, despite a sharp drop in the rate of inventory building. And chances are still very good that this upward trend will continue through 1960.

FACTORY FIGURES OF THE MONTH



Indicator	JUNE[P] 1960	MAY[r] 1960	JUNE 1959
New Orders for Machinery (exc. elec.)[1]	173.0	188.0	175.0
Contracts for Industrial Construction[2]	154.0	141.0	142.0
Factory Production[3]	165.0	166.0	166.0
Consumers' Prices (cost of living)[4]	126.5	126.3	124.5
Industrial Prices (materials, supplies)[4]	128.2	128.2	128.2
Manufacturing Employment (millions)[4]	16.4	16.4	16.5
Total Employment (millions)[5]	68.6	67.2	67.3
Unemployment (millions)[5]	4.4	3.4	5.6

[P] = preliminary [r] = revised

Sources: 1. McGraw-Hill Department of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Department of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Department of Labor, Bureau of Labor Statistics.

One reason for the upward trend is the continuation of strong consumer spending. Retail sales, having slipped in May, again headed up in June.

Growing personal income is the basis for predicted consumer buying stability. During June the personal income level climbed by a little over $1-billion to an annual rate of $406-billion. Again, not a very impressive gain, but enough to encourage higher consumer spending. And if incomes continue to grow, retail sales are sure to follow suit.

Growing pressure for bigger government outlays also helps bolster the outlook. Bigger highway expenditures are already in the cards; higher defense spending is also likely.

Finally, if businessmen carry out their announced plans for higher capital outlays through 1960, rising over-all business is a safe bet.

For your action index

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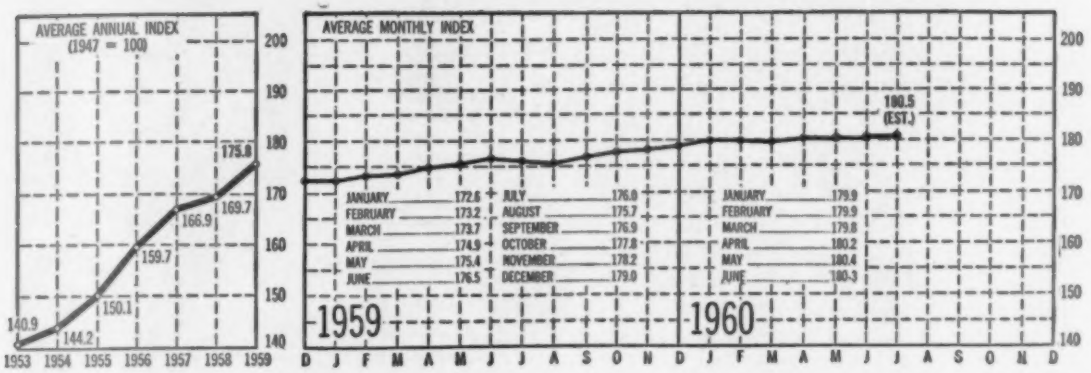
FACTORY PRESS TIME REPORT • AUGUST 1960

Cost Index of Plant Maintenance



Decline breaks trend

After three months on upswing, index retreats. Carpenters' wages foil bigger dip.

After a three-month period of steady increase, FACTORY's Cost Index of Plant Maintenance dipped 0.1 of a point in June to a level of 180.3.

The Index would have fallen even more if declines in materials prices hadn't been partially offset by the second consecutive monthly rise in carpenters' wages.

Materials prices in both major categories of the Index were down in June and, coincidentally, both categories fell by the same amount—0.3 of a point. Several large declines for materials prices helped pull the Index lower (motors off 4.7 points; glass off 4.1 points). But June's decline was definitely not an abnormal event sparked by a few large isolated price cuts. Materials price declines outnumbered price rises by 8 to 3.

For labor the cost story is familiar. Carpenters' wages were up by 0.9 of a point, while the cost of other types of labor remained unchanged. An encouraging note: For the rest of this year, carpenters' wages should remain at their present level. Unfortunately, on the first of next year some automatic pay boosts go into effect.

Only a few prices bucked the general downward trend of costs this month. Mechanics' hand tools rose by 0.2 of a point, and the price of cutting tools jumped by 1.3 points. Solder prices rose by 1.7 points which pushed the index of non-ferrous alloys up by half a point.

For the most part, price declines were small, such as those for steel tanks and copper wire. In coming months you'll probably see many of these small price cuts, which reflect rising competitive pressure.

	AVERAGE 1959	JUNE (Preliminary)	MAY (Revised)
Building and Facilities Index	166.5	171.2	171.1
Materials	142.3	140.8	141.1
Brick	152.5	155.0	155.0
Elec. fixtures	129.0	132.4	132.4
Elec. switches, boards, fuses	185.6	184.1	184.1
Elec. wire, copper	138.9	148.2	148.6
Glass	152.0	147.9	152.0
Gutters, spouts, ducts	178.0	180.2	180.2
Gypsum products	140.8	140.9	140.9
Heating equipment	127.7	126.2	126.2
Lumber	134.5	132.2	132.2
Millwork	155.7	156.9	156.9
Paint	130.1	130.1	130.1
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.9	192.6	192.6
Pipe & tubing, copper	154.1	156.2	161.0
Roofing	123.7	113.2	113.3
Sanitary fixtures	155.6	161.8	162.3
Sash, metal frame trim	140.9	136.5	136.8
Solder	124.1	122.3	120.6
Steel, structural	236.3	236.3	236.3
Tanks, steel	138.0	139.4	140.2
Valves & fittings	166.7	171.3	171.3
Wire mesh	162.6	162.9	162.9
Labor	182.6	191.4	191.1
Carpenters	168.9	178.6	177.7
Electricians	191.1	199.6	199.6
Painters	187.9	196.0	196.0
Equipment Index	179.5	184.2	184.4
Materials	176.1	177.8	178.1
Abrasives	161.0	157.9	157.9
Alloys, non-ferrous	125.4	122.6	122.1
Bars & plate, steel	227.1	227.2	227.2
Bearings	164.1	164.5	164.6
Belting	157.3	159.3	159.3
Bolts, nuts & screws	225.6	223.8	223.8
Chain	184.0	184.0	184.0
Controls (electrical)	185.6	184.1	184.1
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	198.2	203.6	203.4
Lubricants	124.1	125.7	125.7
Motors	147.3	143.6	148.3
Non-ferrous metals	129.0	136.6	136.6
Precision tools	156.6	158.2	158.2
Pumps	194.8	196.1	196.1
Tools, cutting	172.4	188.9	187.6
Valves & fittings	166.7	167.1	171.3
Labor	181.8	188.6	188.6
All mfg. labor	179.9	184.4	184.4
Machine tool labor	184.2	192.7	192.7
FACTORY'S COST INDEX	**175.8**	**180.3**	**180.4**

FACTORY PRESS TIME REPORT • AUGUST 1960

Looking Ahead in Labor

Labor leaders are readying serious moves to take the hurt out of their latest scare word—automation. They have backed labor-saving equipment in recent years, sometimes reluctantly, sometimes enthusiastically. Now, they are seriously beginning to fear it. These union officials are well aware they can't stop it, or perhaps even slow it down.

The route they have chosen to take is the shorter work week. The key to watch is unemployment. While the jobless totals are not yet critical, they hover around 5% of the work force. If this goes higher—and many expect it will—the labor unions will counter with a broad campaign to cut working hours.

Already, the clues to what you can expect are being uncovered. Here are some concrete examples:

• **David J. McDonald's powerful Steelworkers are readying a campaign** in the next Congress to trim the federal 40-hour week to 32 hours by lopping one 8-hour day from the five-day week.

• **AFL-CIO President George Meany calls for a 35-hour week or five 7-hour days**—also by the legislative route. He estimates an over-all loss of 500,000 industry jobs in the past three years.

• **AFL-CIO Meat Cutters Union urges a "massive effort" by labor for a shorter work week.** The union's automation committee reports 160,000 production workers "are now required to produce the same amount that over 190,000 produced in 1956."

•

Similar complaints are being voiced in other industrial unions, along with a variety of suggested remedies that include job security demands through negotiations and/or help from Congress.

At this point, however, it looks as though neither route will be particularly successful. Certainly, in the big industries, union bargainers don't anticipate a big breakthrough in trimming working hours. Nor is Congress, in 1961, expected to help out labor by slicing some time from the 40-hour week. But, as labor becomes increasingly concerned, it will focus its attention on the shorter work week as a spread-the-work answer to automation.

Industry is countering labor's automation fight in Congress. With a late-session "sleeper" bill introduced by Republican Senate Minority Leader Dirksen, employers are hoping to trim labor's job-saving demands. The measure would bar from collective bargaining the subject of job eliminations. Currently, unions can negotiate to prevent management from eliminating jobs, even though employers may claim they are unnecessary. The Dirksen bill would put the matter strictly in the hands of management—as a non-bargainable management prerogative. The measure, already arousing the ire of union officials, is likely to be a big issue in the 1961 Congress.

•

Inside the unions themselves, automation is causing greater in-fighting over jobs. The AFL-CIO's craft and industrial unions, though pledged to respect each other's territory, are heated rivals for plant construction and maintenance work. So far, AFL-CIO Chief Meany's peace efforts have gone unheeded. However, two major protracted disputes are coming to a halt through a formula provided outside the federation—and one that may offer a final way out.

But the National Labor Relations Board has come up with a ruling to end the biggest jurisdictional battle within the AFL-CIO—between the United Steelworkers and the Sheet Metal Workers. For 15 years, the craft union members have refused to install ventilating equipment manufactured by the Burt Manufacturing Company, because the Steelworkers made the Burt products. The AFL-CIO has been trying to settle the dispute for five years. But it took a Board ruling to turn the trick. The five-man agency unanimously found the boycott to be a Taft-Hartley Act violation because it forced other employers to cease using Burt products. In other words, it was an illegal secondary boycott.

In a second case, the NLRB sided against the Steelworkers in a contest over jobs with AFL-CIO craft unions. The USW, representing workers at U. S. Steel's Tennessee Coal and Iron Division, sought by picket lines to prevent the company from giving construction work to outside contractors and their craft union employees. The Steelworkers, who had had recent layoffs, demanded the assignments and closed down the plant to secure them. The NLRB held this was illegal pressure.

SEE LABOR RELATIONS NEWS, PAGE 182

Performance makes the world of difference

Fig. 1503 — Steel Gate for 150 pounds W.P. Outside screw rising stem and yoke. Solid wedge disc. Screwed-in seat rings.

Fig. 560 — Bronze Regrinding Horizontal Swing Check Valve for 200 W.S.P. All parts are renewable. Can be used in horizontal or vertical position.

Fig. 2600 — Bronze "WS" Full Flow Globe Valve for 150 W.S.P. Union bonnet. Screwed ends only. Hardened stainless steel renewable disc and seat ring.

Fig. 3058 — Carbon Steel Screwed-End Lubricated Plug Valve. ASA 300 pounds. Screwed gland type. Wrench operated.

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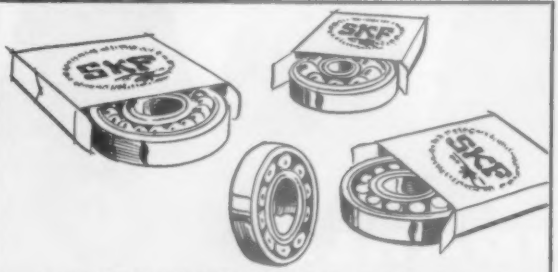
DISTRIBUTOR DAN, the SKF bearing man, shows

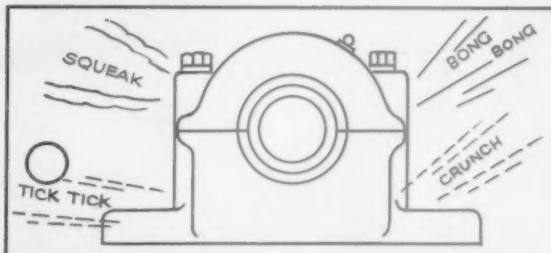
HOW TO CHECK BEARINGS DURING RUN-IN

—to prevent damage and downtime later!



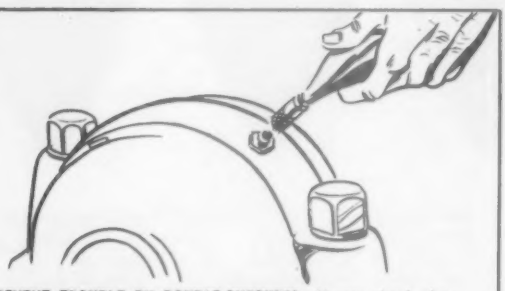
THINK BEFORE YOU INSTALL THEM. The first few hours of operation are the most critical in a bearing's life. So, operate the bearing at reduced speed and load during run-in. Bearing run-in periods vary from a few hours to a few weeks, but 24 hours is usually sufficient.

NOISE CAN BE A SYMPTOM. A soft, purring sound is all you should hear from a bearing—if it's operating correctly. Check by placing the blade of a screwdriver and listening at the handle. Any other noise means trouble sooner or later.



KNOW YOUR NOISES. Squeaking means inadequate lubrication. Metallic tones indicate shaft or housing interference or improper adjustment. Smooth, clear tones tell of marks in the stationary raceway. Intermittent noises indicate a damaged ball. Crunching means dirt.

TOO HOT TO HANDLE? There's trouble brewing if the housing feels excessively hot. High temperature usually indicates overlubrication or use of a lubricant with too high viscosity. It can also be a sign of excessive axial or radial preloading, misalignment, tight-fitting seals, or rubbing.



PREVENT TROUBLE BY DOUBLE-CHECKING. Always check the bearing after the critical run-in period. Examine the lubricant. If it's dirty, change it. Check the seals for signs of wear or damage. A few minutes spent double-checking now eliminates chances of costly damage and downtime later.

Baffled by a bearing problem? Whether it's selection, mounting or maintenance—consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.

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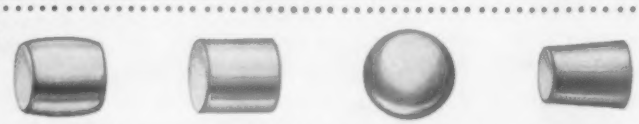

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Interlopers on the plant scene

Time was when the plant superintendent chewed tobacco, wore a shop coat, could run any machine on the floor, kept the production figures in his head, and generally acted as if he were beholden to nobody. Never more. Today, you're likely to find him sucking a Lifesaver, decked out in a narrow-shoulder suit, hesitant to try his hand on the new Milwaukee-Matic, dependent upon the paper shufflers in the front office for operating costs, and with hardly enough free room for unrestricted action to swing a cat.

An exaggerated picture? Sure. But there's small doubt that the old tiger's fangs have been pulled. He's had to adjust to an awful lot of change in the past 30 years. He's seen the finance boys clamp a vise around his spending options. He's seen the personnel guys second-guess him to death in labor matters. He's given ground, inch by inch, to the ubiquitous industrial engineers. He's even seen the cut-and-patch maintenance foreman crawl out of the boiler shed and up into an office with a slide rule and a swivel chair.

Yes. The current crop of plant operations managers have had many a laugh on the old-time bull-of-the-woods who couldn't quite catch on to the group-sing approach to running a plant. But now the shoe is on a different foot. The pinch of change is beginning to squeeze the complacency of this latest group.

Changes in the techniques of plant manufacturing management are accelerating. Traditionally "outside" functions are penetrating the sphere of operations that the plant group protected so well for the last three decades. Its realm is being pressed by the ambitions of the purchasing agent, the product designer, and the data processing expert. Purchasing is shifting its emphasis from price haggling to value analysis and materials management. Product design is extending its concern to manufacturing problems and costs. Data processing is starting to link together all the facts and figures of orders, operations, maintenance, and inventories. Each of these three functions of management is finding new horizons in plant operations.

The challenge to plant operations management—the challenge to you—is to recognize this trend toward greater integration of all the manufacturing functions. And to anticipate how this trend will affect your company tomorrow if it isn't doing so right now. And to demonstrate that in your know-how lies the answer to coordinated effort. After all, once sales information enters the plant, all activity becomes operational, with processing equipment and facilities at its core. Management people in production and in plant maintenance and engineering and its related services are best equipped to direct the adjustment of the business to these new forces. In the absence of your efforts, however, you may find interlopers on your scene. There's no *good* reason for plant operations management to play second fiddle to any of the other functions. No reason except lack of foresight and initiative.

L. R. Bittel

EDITOR-IN-CHIEF

CONTROLLED PLANT INFORMATION

A NEW AND NEEDED MANAGEMENT CONCEPT

The last few decades have seen a tremendous improvement in plant efficiency. The key: integrated control of the whole manufacturing process, from unloading raw material to shipping the finished product. Lifeblood of this control: information—about what's going on, every step of the way.

Ironically, in most cases, the control information itself is far from being adequately controlled.

The volume of paperwork that management men are expected to digest is inexcusable, especially when so much of it is unnecessary, unreliable, incomplete, too late, and too poorly organized to be of much use. This situation will continue until *you* do something about it.

Plant managers are ideally suited to solving the information problem. First, they know the importance of efficiency and how to achieve it. Second, they're the men who suffer most from haphazard information systems. Third, they know better than to expect a machine or a new form to solve anything, of and by itself. Finally, they know better than anyone else what information they need, when they need it, and in what form.

To effectively fight for information control, you'll need some background. This article will tell you what the problem is, how it came about, and what can be done about it. It will tell a little about the hardware and language of data processing (DP) so you can hold your own with the punched-card sharks and computer specialists. It does *not* attempt to tell anything about the care and feeding of cards, forms, hardware, accountants, and bookkeepers. It does tell what *you* need to know to get Controlled Plant Information (CPI).

Turn the page

By ROGER W. CHRISTIAN, Associate Editor, FACTORY

CONTROLLED PLANT INFORMATION

. . . CONCEPTS

If you're a typical manager, you receive monthly all the information you need to efficiently control *last* month's operation. You'll get control information on *this* month's operations *next* month.

Moreover, the chances are you aren't getting usable information at all. You're getting reams of data, just as they're chopped out of an accounting machine. You have to slug through 15 pages of what's right to dig out for yourself the item or two that's wrong—the only things that need attention.

You may be getting reports out of sheer habit. Reports that were once useful—to you or to your predecessor—but which no longer do the job. Even more likely, you're *not* receiving certain information that would be helpful—if you could get it.

Net result of this information mess: You're expected to run an efficient, integrated operation on the basis of decidely *unintegrated* control information that's incomplete, cumbersome, probably inaccurate, and invariably too late to be of much use You're expected to correct situations that were haywire last week or last month. But you're also held responsible for what's haywire today.

Exaggerated? Don't you wish it were! Even if you're lucky, and you're getting the control information you need on time, your load of paperwork and dry reading is sapping time and energy you could spend on more productive and satisfying activities.

But cheer up. The information mess is a colossal problem, but it can be licked. It must be. First step: Understand the paperwork problem, why it exists, what can be done about it. Second step: Get into the fight. Don't leave it to the card pushers. It's not their problem. It's yours. It's not their fault, either. Frankly, it's yours—at least partly.

The information mess is your problem

The heart of any good information system is data processing—forging raw facts into usable information. Yet this is the biggest source of trouble in many companies. Who's at fault? Management, which has consistently compromised the welfare of its companies in at least three ways:

- It has failed to recognize the importance of data processing to the company.
- It has been indifferent to data processing, has neglected its direction and control.
- It has ignored signs of serious trouble.

This is a pretty grim indictment, but the evidence is overwhelming.

Management has failed to recognize the importance of information—the life blood of any business. Control is impossible without it, communication is impossible without it, operation itself is impossible without it. However, in most companies, the preparation and distribution of information is not recognized as a corporate function like production or marketing. Every company needs information. But how often do you hear of an information manager?

The people responsible for preparing and distributing information normally report to an accountant, a financial officer, or some other staff manager. And they're usually pretty far down the totem pole. The man they report to either jealously insulates them in his own little empire, or feels abused because these orphans were inflicted on him. The less they bother him, the better. They're either cut adrift to do as they please or are subject to the whims of every manager in the company.

In large companies, there may be several groups handling data processing. One in manufacturing, one in accounting, a third in engineering. Each group has its own forms and equipment, its own names for the same thing. The duplication of work, information, and hardware can be appalling. Is it any wonder that in a recent survey nine out of ten companies said they were dissatisfied with the way information is handled? Or with its fantastic costs?

Management's long indifference to data processing is not hard to understand. Back in the dark ages of clerks, pens, and ledgers, most data processing was done by managers themselves. The tedious bookkeeping functions—largely recording and simple arithmetic—were cheap. Businessmen had first-hand knowledge of all the details they needed.

As adding machines (and later bookkeeping machines) took over, the clerical force still confined itself to dull, repetitive, and insignificant activity. Then came punched cards and tabulating machines.

By this time, management had developed the fine art of being right 51% of the time on the basis of incomplete (and always historical) information. What the drudges in the data processing department did with themselves and their noisy hardware was a matter of little concern to a man with big things on his mind. Machine rental was tax deductable.

Still, some managers were uneasy. The machines turned out a flood of paper, but the information was hard to use, and it was always far too late. Reports showed what had happened, not what was happening. The clerical payroll kept growing. More space was needed. The supply budget put on weight.

Finally, computers showed up and started attracting attention. They caught the imagination as nothing had since the automobile. They caused the same awe, were just as quaint and faulty at first. And it was just as fashionable to have one.

Computers were something a busy manager could take time to look into. Here was a tool *worthy* of his

attention. Scientists had to operate it. It had glamour and mystery. It could do marvelous things. And it cost like sin.

Management's interest in computers had two excellent results. First, it discovered that data processing could cost—and was costing—a staggering amount of money. In fact, as much as half the total cost of doing business. And management had been ignoring this whole area for generations!

Second, it soon became apparent that here at last was a machine that couldn't just be plugged in to do the old green-eyeshade work in a new way. This has been a disappointing discovery to many. The data processing *system* was like a time-honored old plow. We quit pulling it by hand, and hitched it to a horse. Then we fastened it to a tractor—even a supercharged tractor. But now, alas, we have an airplane, and the two just won't work together. A completely new system is vital.

Management has ignored signs of serious trouble. Poor information didn't become a problem overnight. For years, management has had to work with dull tools: Information was inadequate, late, and had to be dug out of tedious reports. Paperwork didn't suddenly build up to flood proportions—it has been doing so for years. The clerical force has been growing for years. Recently, white-collar workers passed production workers in number. Costs have rocketed. Three steps are needed to resolve these difficulties.

1. Information handling must be recognized as an important company function, decidedly worthy of top level attention and control.

2. Present systems must be analyzed and modified. A completely integrated, company-wide information system must be set up and turned over to a tactful, forceful manager. He must know the importance of the job, have a broad company viewpoint, report to a top executive, and have top-level support.

3. The new over-all system must be put into force and kept up to date. This will bring a lot of changes —and a lot of benefits—all along the line.

The catch phrase about integrated information systems bringing the second industrial revolution is valid. The impact will rival that of mass production.

The rapidity of change in the business scene today has outmoded certain long-standing concepts. Information one department uses is of importance all through the company. Trends and inefficiencies must be spotted instantly and fast action taken. The old idea of having department heads decide for themselves how to handle their information and on what forms is strangling over-all company efficiency.

Just as craftsmen had to adjust to new limitations on their freedom of choice and action to get efficient production, department heads and middle managers are going to have to accept limitations and constraints in the interest of efficient information systems —that is, efficient operation. This second major adjustment is going to have to be made faster than the first one, and against much greater odds.

Intuition and "business sense" are no longer enough. Companies can't be run efficiently by the seat of *anybody's* pants. The competitive, the political, and the international facts of life have made patchwork information systems not only costly and inadequate, but downright dangerous.

The information that controls industry—including manufacturing—must be integrated, just as manufacturing was, years ago. This is such an obvious fact, and the cost of ignoring it is so great, that management's past indifference is astonishing.

It's time to get our heads out of the sand.

At its heart is data processing

The heart of any information system—good, bad, or indifferent—is data processing. Like any heart, it affects the health of the whole system. If you don't take care of it, it's likely to fail.

Data processing isn't the exclusive province of the clerks and card-pushers, remember. You do it yourself, all the time. Right now, as you read, you're doing data processing. When your boss calls up to put the heat on an order, you look at your shop schedule, search your memory to see if you can push the item out the back door faster—data processing. You write a personal check and adjust the balance—data processing. A foreman calls in sick and you look over a work schedule to see who can replace him—again, data processing.

Data are statistics, facts, specifications. Processing organizes, relates, and summarizes data into some meaningful arrangement. It makes *information* out of data; information that tells you something. If you see 32-28-34 on a sheet of paper, what does it mean? Bust-waist-hips? Or length-width-height? Or shipped-reworked-scrapped? To find out, you need more data—and more processing.

You handle *data* every day, but if you aren't now getting the *information* you need, when you need it, and in the best usable form, it's time you got actively interested in data processing.

Don't kid yourself that you're too busy to look into it now. Remember the lumberjack who was so busy he didn't have time to sharpen his axe. The harder he worked, the duller the axe got.

There are at least five good reasons why it's time for a new look at data processing.

Reason one, business is changing. Much more paperwork is on the way—more government reports, more laws, new products, changing markets. As business grows, there is a kind of Parkinson's Law of paperwork. To get more information, plants often wind up generating information about the information. To process the added data, more people and more machines are needed. These, in turn, must be controlled, which necessitates still more data. And 35% of all clerks check the work of other clerks.

Reason two is the impact of better and more useful equipment. Automatic data processing has made tremendous strides in the last decade. Speeds, ca-

CONTROLLED PLANT INFORMATION ... CONCEPTS

pacity, ease of operation, reliability, have all been markedly improved. Devices can be hooked onto typewriters, posting, adding, teletype, and tabulating machines that permit automatic production of a paper tape as a by-product. Data centers can be economically linked together all over the country by leased wires. Small, cheap computers are on the market, and the downtime from equipment failure has been cut 50%.

Reason three is the fact that cost reduction is becoming increasingly important. Grim tales of shrinking profit margins, brutal taxes, outmoded depreciation laws, and the like, are well known. More and more, labor is becoming a fixed, rather than a variable cost. With outmoded data processing, a company faces further bloating of the office force, coupled with a rapid rise in the load of paperwork and continued inefficiencies resulting from trying to control today's business with yesterday's information.

On the other hand, effective data processing systems can cut costs dramatically while giving you the kind of information you need for much tighter control throughout the plant. Many companies have cut their paperwork load in half. While net reductions in clerical help are rare—in spite of a widespread myth to the contrary—it's almost certain that streamlining your data processing will head off the need for more and more clerks as your data processing load increases—and it *will* increase.

Reason four is that, with proper systems and high-speed equipment, you can now get vastly improved control information at low cost. Traditionally, production has been scheduled on the basis of sales forecasts, which, in turn, were based on history. Now it is feasible, in many cases, to schedule production on the basis of firm orders in hand. No guessing, no safety cushioning, no over- or under-buying of raw materials, no intuition-controlled inventory, no vacillating labor force.

Reason five is the dramatic growth of automatic installations and streamlined systems in industry generally. If your competitors and customers get trend information a month or two before you do, you're going to be bruised. Many top management people are awakening to the fact that data processing is a competitive tool.

Once aroused, these top-level men are going to take action. Many already have. Don't be left at the post. A serious, profound change is under way.

CPI is already solving your problems

Here's *proof* that good information systems pay off—and handsomely. These six cases illustrate how progressive companies—large and small—are streamlining processes and tightening schedules simply by having the right information at the right time. Their hardware and techniques differ, but the end result is the same: Controlled Plant Information (CPI).

If you think CPI is too expensive for you, consider this: The clerical work force grew 58% between 1940 and 1950. It grew another 33% between 1950 and 1960. At the same time the productive work force shrank 5%.

Expensive? You can't afford *not* to have CPI!

PRODUCTION CONTROL BY COMPUTER

Finger-tip facts on shop load and operating efficiency have enabled American Machine & Foundry Company's Brooklyn (N.Y.) plant to sidestep most of the grief associated with intermittent, job-lot production of highly engineered equipment. Hard facts about the impact of new work and scheduling changes now eliminate guesswork, flag bottleneck situations in advance. Overtime, farm-out jobs can be *predicted*. Delivery dates are hit on the nose.

The master production schedule is set up a year in advance, revised quarterly. Schedulers, armed with weekly load figures for each area, fit in new jobs by working backwards from shipping dates. Cards, punched for every operation in the plant, are scanned weekly by a small Univac computer, which prepares current load reports, work-behind-schedule reports, and efficiency reports by machine group, operator, job, and product line. Monthly, it reports hours gained or lost, by area, with reasons for the variance. The cards that stay with the work indicate work coming, in process, and overdue.

QUALITY CONTROL ON NOTCHED CARDS

Lawrence Manufacturing Company, a Lowell, Mass., textile producer, prepares defect analysis reports in one-fifth the time formerly required, thanks to notched cards. Damaged material loss has been slashed; inventory and production control improved; machine maintenance, finished products, customer relations are all better than before.

As each roll of material goes on a knitting machine, the operator writes his name, the date, machine number, and yarn vendor onto a Keysort card in pencil. The card is then broken into two inspection tickets. One is filled out and notched after the knitting inspection, the other after the dye inspection. Later, all tickets for the day are sorted according to type of defect, and tabulated. Next morning, a report is ready showing number and type of defect on each roll, and production step involved. Fast action on target minimizes losses.

PRODUCTION RECORDS ON PAPER TAPE

In addition to saving $7000 a year and enjoying large gains in time and accuracy, the Freeman Shoe Corporation of Beloit, Wis., pockets other advantages. Legibility of production records is much improved. Creation and modification of master documents is greatly speeded and simplified. And the number of master documents has been slashed.

Formerly, Freeman clerks prepared 13 carbons of production tickets, daily production sheets, etc. One carbon was used by keypunchers to make cards for the computer, showing work in process.

Now, a paper tape and punched cards are automatically produced as a by-product of a seven-carbon original typing. The tape is run back through the typewriter for no-hands production of seven more carbons. It then goes to tabulating and is used to prepare computer cards automatically. The cards knocked out as a by-product of the typing are master documents. Either they or the tape can be interrupted in action so an operator can blend in manual modifications to information being transcribed.

INVENTORY CONTROL BY COMPUTER

A cool million dollars a year is being saved on reduced inventory alone at the Newark (N.J.) meter plant of Westinghouse. The key: imaginative inventory control and the phenomenal speed and memory of an electronic computer.

Inventory is used as a variable—a flywheel to dampen the peaks and valleys of production. Using sales figures, and taking into account the costs of labor turnover, machine set-up, inventory, scrap, overhead, and stockouts, the computer makes a number of decisions. These include when to stock an item formerly produced to order . . . When to adjust inventory on an item losing popularity or subject to activity deviation . . . When to re-order each item . . . Which items can be lightened with least risk when capital must be generated . . . When lead times should be changed and by how much. The computer constantly checks itself against actual results and refines and adjusts the variables and assumptions with which it works. Ultimately, the computer may select suppliers, write purchase orders directly. You can't put a price on benefits like these.

PAYROLL ON PUNCHED CARDS

G-E's Automatic Blanket and Fan Department, (Bridgeport, Conn.) is getting current labor cost breakdowns as a by-product of mechanized payroll procedures. Every employee gets an individual gross earnings statement showing every penny earned by day and by job, with pieces produced, prices, incentive wages paid, all deductions, and net pay.

Same data are used to produce a weekly labor distribution report by shift within department, and a summary report of department and plant totals.

Complex payroll would be a real headache with manual methods. Employees are paid by any combination of five methods: partial and full incentive individual piecework, partial and full incentive group piecework, and hourly wages. Add overtime, "make-up," and other adjustment possibilities, and it's evident that only machine methods could prepare the detailed earnings statements mentioned above economically, quickly, and accurately.

MAINTENANCE CONTROL ON CARDS

Periodic maintenance was too easily overlooked at Jackson Mills (Iva, S.C.) in spite of the best intentions. Now, notched-margin cards control several operations. Emergency maintenance in one plant was slashed by two-thirds and work stoppages have been tamed in all plants.

One deck of cards is the lubrication schedule for 40,000 electric motors scattered throughout 100 buildings. Another deck (with five-year records for each motor) is used for scheduling maintenance inspection, later used for analysis of maintenance effectiveness. Third deck acts as work orders.

Turn the page

(Cover Story) Automatic Plant Reporting

Greatly increased accuracy, invaluable time advantage, and "free" capture of information formerly impossible are now routine at Federal Telephone and Radio Company, Clifton, N. J. (division of ITT), thanks to Controlled Plant Information.

Basic input costs are about the same as under the old system, but over-all costs are much less, reflecting fewer errors, new information, and faster action to clear up shop trouble. Four keypunch clerks have been freed for other assignments. Manual reporting errors and wasted time have been cut to an insignificant level in the plant.

Stromberg (General Time) Transacters spotted in the plant automatically report job status, labor data, and materials activity at electronic speeds to a central Compiler that prepares a paper tape. Tape is later converted into punched cards for computer processing. Time, date, and machine location are captured, along with the formerly unavailable unit, part, job and operation numbers.

Direct manufacturing labor and attendance are still recorded by time-keepers. But automatic Transacters are so fast that timekeepers have plenty of free time to fill. Federal has them fill it by recording direct engineering labor (unavailable before) and materials control (which before was loaded with errors and unrelated to part, operation, or unit serial number).

Result: Federal enjoys daily reports on total job cost by order number, by payroll and charged departments.

Federal plans to convert other segments of its plant reporting system to Transacters, and will end up ultimately with complete daily cost reports on every job from preparation of engineering drawings to collecting payment after delivery. Satisfied? They're downright exuberant!

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INFORMATION

TOOLS YOU CAN UNDERSTAND

Information handling is a three-step function:

1. Gathering data from basic documents such as sales orders, work orders, purchasing orders.

2. Processing data—sorting, computation, and organization of data; establishing relationships; and preparing reports. Processing turns data into information. This is the step that involves most of the repetitive activity—that lends itself best to automation.

3. Distributing information on the basis of which decisions are made. These decisions bring about action, and the action results in the generation of new source data. Then the cycle starts all over again.

Clearly, the tools of information handling range from pencils and paperclips right through display boards and Verifax machines to punched cards and computers. Since we're more concerned in this article about the end results than the means, we won't get too deeply involved with hardware. But we'll have to discuss it a little. After all, a man who doesn't know the difference between a fork truck and a jib hoist can't control material handling. Our goal is to get control of information handling.

Since nearly everyone is familiar with display boards, office copying machines, and the benefits of using such equipment, we can pass over them and concentrate our attention on the more elaborate hardware.

Data processing machines are no more complicated than production machines—usually far less. You can understand them well enough with very little effort—and you *should* understand them. Even the smallest companies can usually get the benefits of proper data processing—some degree of automatic processing—for much less than they are spending for old-fashioned methods. Many companies with as few as two clerical employees, and as many as 35, have been able to cut these requirements in half.

Turn the page

CONTROLLED PLANT INFORMATION

. . . TOOLS

One idea the high priests of data processing like to encourage is that the computer—a tool sometimes useful for DP—is hard to understand. It's full of wires and transistors and all manner of "heap good medicine." Let's dust that one off, right now.

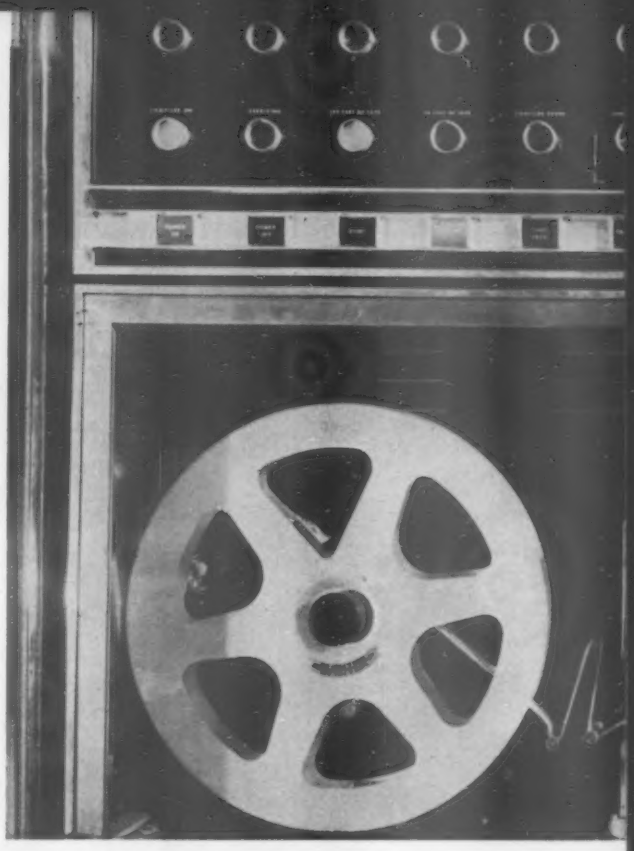
There are two basic kinds of computers. An analogue computer measures; a digital computer counts. Your car speedometer is an analogue computer. The string of beads over a pool table is a digital computer. This is over-simplified, of course, but the basic principles are the same. And all you really care about are basic principles. You don't have to play this violin to enjoy its music.

What's the difference between a computer and a calculator? A computer can store numbers as well as manipulate them. Numbers have to be fed into a calculator as they're used. Computers also do a series of operations in automatic sequence. And can "branch"—that is, select the proper series of steps to be performed under certain conditions.

But you don't have to worry much about what goes on inside DP hardware. You need only be concerned about what goes into it and what comes out. The data going in must be accurate and complete. The information coming out must be in a form you can use and must reach you while it's still news. You're probably getting history now.

10 TIPS ON HARDWARE SELECTION

1. **Buy only what YOU need;** don't try to keep up with Jones Company. These toys can eat you alive.
2. **Allow for expansion,** peak loads, machine down-time, new applications. Extra capacity is cheap.
3. **Don't go overboard on speed.** Get the facts on time, but don't pay extra to get them ahead of time.
4. **Don't expect any machine to resolve anything.** Tools are only as good as the people using them.
5. **Insist on getting decisions,** not just reports, if you put in a computer. That's what they're for.
6. **Weigh cooperative installation** possibilities if costs are too steep to swing alone.
7. **Get the cheapest and simplest-to-operate** gear that **will** do the job. Don't buy chrome and gadgets.
8. **Don't hang new machines on an old system.** A horse with dual carburetors would still be a horse.
9. **Check those "buy option" lease clauses.** Recent tax rulings have turned some plums into prunes.
10. **Consider compatability** with your present and expected future equipment.

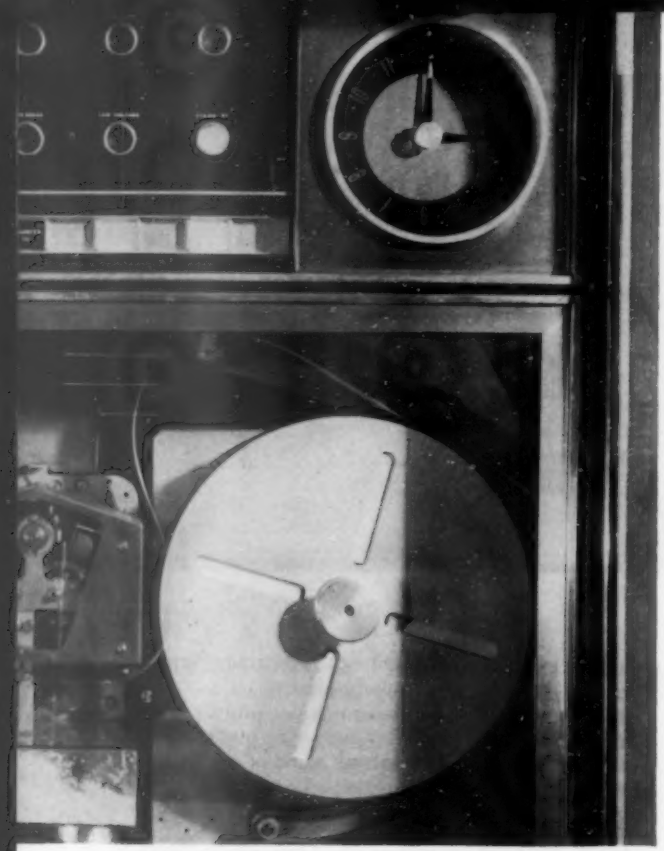


TAPE COSTS LESS

Even in the smallest companies, a sale generates about half-a-dozen documents—often more. In most cases, the information mess starts right there, with chronic rewriting of the same information for different purposes. First a sales order is typed. Then a requisition, followed by a multi-page purchase order and confirmation. Then everything is retyped into a production order. It's typed again for billing purposes, redone for the shipping department, again for sales analysis, again for general accounting, and so on. Anywhere along the line, errors can creep in. Time, money, and effort are being wasted.

The simple, *cheap* solution for all this is paper tape. As the original document is prepared, a paper tape containing the same information is automatically produced. From there on, machines prepare the paperwork from the tape—quickly and without error—while the humans go about work that machines can't do. Auxiliary paper tape devices can be used with typewriters and adding, Teletype, posting, accounting, and various other office machines.

Paper tape has other advantages, too. It can be mailed, filed in a tiny space, and re-used over and over. It can be used to prepare punched cards five times faster than a girl can keypunch them. It can be converted directly into magnetic computer tape, or read right into a computer. It can be used selectively—recording only fixed information such as



Compiler at ITT-Federal receives and stores on paper tape the data sent by Transacter on plant floor (see cover).

customer name and address, but not variable information like quantities and delivery dates.

The key to all this versatility is that paper tape is "written" in the universal language of data processing—the hole. Wherever there is the possibility of human error, sooner or later that error will be made. When a clerk is transcribing data from one document to another, boredom, fatigue, and plain indifference take their toll. A three becomes an eight, a seven a nine, and decimal places wander.

But there is something inexorable about a hole in a card or a piece of paper. It's either there or it isn't. It never drifts, never changes, never looks like anything but a hole—in a very specific location. Machines that "read" and "write" holes invariably transcribe them—and the data they represent—precisely. They're never tired, never distracted.

Several manufacturers this year brought out equipment to eliminate manual reporting of plant data such as job status, tool crib and production activity, and maintenance. Input hardware is located at stations on the shop floor. A worker or timekeeper just inserts cards or plastic tickets containing job, machine, and employee number into the equipment. Quantity, etc., is entered by setting dials or depressing keys. Electronically, the data are flashed to a central unit that enters time and date, then prepares paper tape or cards for later processing. Time and errors are cut dramatically. (In the near future, FACTORY will have a comprehensive discussion and case studies on this new DP equipment.)

CARDS ARE FASTER

A far different medium of data processing—not necessarily better than paper tape—is punched cards. The two are often used in combination, with excellent results. Punched cards have all the advantages of paper tapes, plus a few of their own. They can be:

- Rapidly sorted and collated.
- Very durable—they're even available in plastic.
- Easily cross-indexed.
- Rapidly reproduced and searched.
- Easily manipulated and refiled.
- Purchased with cut-outs for microfilm, photos.
- Printed, typed, or drawn on directly.
- Easily color-coded for rapid identification.
- Used directly as invoices, checks, etc.

Like paper tape, cards are more convenient, harder to alter, easier to control, and provide more compact filing than ordinary sheets of paper.

Basically, there are two different kinds of punched cards. The first are edge-notched cards, which are manually sorted and manipulated. The center of these usually contains printed or handwritten information. Along all four edges, there is a row (sometimes two) of small holes. Each hole is assigned some significance—representing a particular product or machine location, for instance. Information is entered by cutting away the edge of the card above the appropriate hole, and forming an open notch where the hole was.

To sort the cards, a clerk lines up the deck and thrusts a sorting needle—about the size of an ice-pick—through the hole that records the data she's after. When she lifts up the needle, the notched cards—the ones she's looking for—drop down, since nothing is holding them. The un-notched cards stay skewered on the needle. Simplicity itself. Information in the cards can then be machine-posted.

The second basic type of punched card is designed especially for machine handling. Government checks and electric bills are familiar examples. Usually, these are prepared on special keyboard machines or come out as by-products of another operation—preparation of a production order, for example. Information in the cards can be extracted and manipulated in many ways. Here's a list of common punched-card machines and what they do:

Keypunch: An electro-mechanical machine with a keyboard similar to a typewriter. Instead of printing symbols, it punches holes (some do both).

Interpreter: Holes are hard for people to read. This machine prints along the top of the card the information the card contains.

Sorter: Self-explanatory. Some sorters are electronic—can count and edit on the fly.

Tabulator: This is the heart of most installations. It can perform all manner of arithmetic, and print out reports, invoices, and so on.

Collator: This machine is used to merge decks of cards together in a certain sequence.

Calculator: Self-explanatory. Results can be punched into a new deck or added to original cards.

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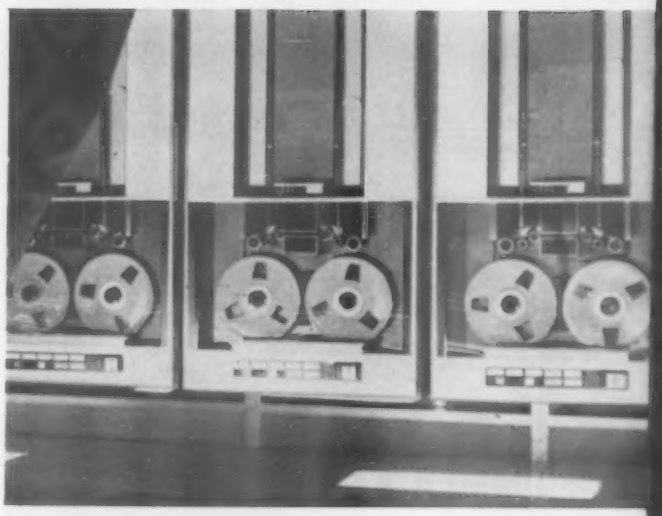


COMPUTERS: THE ULTIMATE

Computers and their associated equipment represent the most sophisticated data processing hardware available. If you need a computer and use it properly, it can be a real Messiah. If you don't, or if you misuse it, it's a form of instant catastrophy. Probably no other machine in the history of business has been so widely misunderstood, and plenty of companies have been badly scalded. A recent survey by one of the top consultants in the field showed that most of the companies that installed computers "to reduce data processing costs" were disappointed. Some were outraged.

On the other hand, 69% of all non-government computers are being used in the manufacturing industries. G-E alone has over 50 of them now, with many more on order. Many companies—including a lot of small ones—are highly enthusiastic about their computers. Small computers are now available at relatively low cost, and they're plenty powerful. They're rapid, rugged, and reliable, and can have a spectacular effect on your operating efficiency.

Conclusion: Computers are wonderful—sometimes. But they're only glorified slide rules, so don't expect miracles. And walk—don't run.

Modern business computers are unquestionably the greatest advance in data processing since shorthand was invented half a century B. C. They arrived suddenly with much fanfare, did some prodigious things, and were promptly given the world's most miserably unwarranted nickname: Giant Brains. It has taken management 10 years to find its way out of this enchanted forest.

Giant brains, my foot. In the first place, they're high-speed idiots at best. They can't multiply or divide, for instance—they have to add or subtract repeatedly. In the second place, they never were giants—just cumbersome. Transistors have changed all that, making them more rugged in the process. Computers are powerful management tools—period.

Have computers been oversold, then? Overrated? No. They've been *under-used*. And underrated, if anything. Few companies are using computers properly—exploiting their strongest points. Misunderstanding and misapplication are making monsters out of what should be an invaluable servant.

For example, one manager learns that computers are incredibly fast, so he buys one and uses it just to put out the old reports faster. He's now got the highest paid clerk in the world. Another is told that computers have huge storage capacity, so he gets one and throws out his card files. He now owns a colossally expensive filing cabinet. Accuracy, versatility, and glamour are similarly abused.

The second big reason that computer projects turn sour is a serious and almost universal tendency to underrate the problems involved, some of which will be discussed later in this section. For good or bad, the installation of a computer can have a terrific impact on an organization.

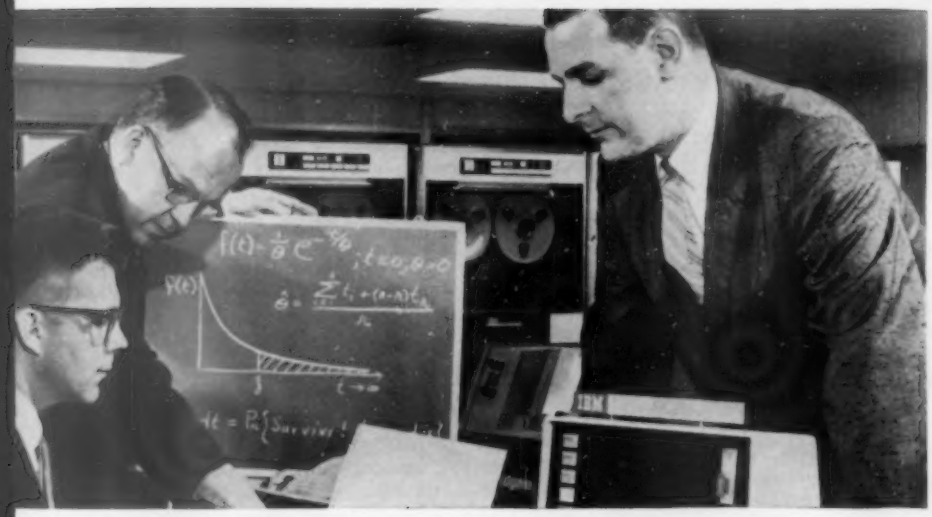
Their power and potential

Listing the things a computer can do would take as long—and be as useless—as listing the things a wheel can do. Both devices can do a great many things. It all depends on how cleverly you use them.

In successful manufacturing applications, computers can be much more useful and effective than they can in accounting or other office-centered applications. They control inventory in a truly scientific manner. True stories of 10% to 60% cuts in inventory—with adequate safety—are now commonplace.

Computers can completely take over such ancient headaches as requirements planning, parts explosions, production-line balancing, shop scheduling, literally up-to-the-minute job costing, maintenance scheduling, machine loading. They can change your files from storage units to really useful sources of information. They can make dramatic inroads in your reading and paperwork load. They can even tell you exactly the best time and place to incorporate new engineering changes into your product line. Perhaps most important of all, they permit "management-by-exception"—in many cases for the first time. And the facts you get are current—not a week or a month old.

How about the cost? There's a lot of misunderstanding on this point, and computer costs have become a kind of whipping boy as a result. Two things should be kept in mind. First, computer costs, considered as so much money per bit of information processed, have dropped a full 99% in the last decade. Major credit for this goes to transistors,



Managers at Texas Instruments use a new, all-transistorized data processing system to solve problems in quality assurance. Said to be the first installation of an IBM 7070, the system is used in the development of advanced solid-state components for tomorrow's computers.

which have almost completely eliminated the brutal costs of maintenance, elaborate air conditioning, frequent and lengthy downtime, special floor space (about the size of a tennis court), and other outlays associated with vacuum-tube computers.

Result: you get a great deal more now for less money. Example: what would have cost $20,000 a month in 1958 can now be picked up for $7800.

The second consideration is that the computers that attract the PR guys, and that salesmen like to talk about, are the biggest ones—the "holy-cow" hardware that can run the State of Indiana with one tape unit tied behind them. Sure, these monsters cost millions, but who cares? You can use a splendid little computer these days for only $250 a month. These little rigs have a remarkable bag of tricks and they're simple to operate.

The general run of small computers rent for under $4000 a month—usually, about $1000. The medium- and large-scale machines cost anywhere from $7000 to $60,000 a month to rent. Costs of outright purchase roll up in proportion.

But don't let the higher-priced computers frighten you off. One of the midgets might be plenty powerful for what you need. Esso Standard Oil recently threw out a computer system worth $500,000 and replaced it with a desk-sized rig (Royal Precision Corporation) at one-tenth the cost. The smaller device took over at the Baton Rouge (La.) refinery and is doing the job nicely. Saving: $450,000.

Computers offer several advantages—all of which can be abused. Let's look at the values and pitfalls:

STORAGE

Because of their large storage capacity, computers enable you to dispense with the reams of supporting detail now included in your reports. This detail is available, inside the computer memory, in case it's needed. The storage capacity also cuts down the need for manual intervention when exceptions turn up. Without computers, every irregularity is an exception, and somebody has to take over by hand. A computer can store the information it needs to handle irregular cases on a modified internal routine.

This is easily overdone, however. The computer must be told in meticulous detail just how to handle each exception, and must store all the extra information and extra instructions it will need. But computer storage is costly, and these exception routines soak it up at a horrendous rate. Soon the internal bookkeeping outweighs the calculation and creates new data processing problems bigger than the ones you were trying to solve in the first place.

VERSATILITY

The internal versatility of computers permits them economically to produce information in various useful forms and relationships not feasible before. This by-product data has often proved one of the greatest boons the machines have to offer.

The pitfall here is that there may be a temptation to overdo the production of facts in different relationships. This is especially true if the computer is controlled by the accounting department, which often takes great pride in the number of ways it can manipulate a given amount of data. Result: heaps of reports of dubious value, wasted computer time, and wasted labor. Worst of all, this pile of junk lands in your reading box.

SPEED

The phenomenal speed of computers has almost become their trademark. And well it might. Computer designers working on advanced machines are already being frustrated by the speed of light. It just takes too long for an electron to go through a wire a quarter of an inch long—it slows up the whole computer. Even the plodding computers now on the market measure their calculation times in millionths of a second. Some can hunt through their files for something and report back a few thousandths of a second later. Printing units knock out reports a line at a time—10 or 15 lines a second.

All this speed has practical value. For instance,

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a defense contractor recently discovered that computer handling of certain paperwork brought about government payment about a week earlier than before. The result: an $18-million cut in capital needs, right off the bat. The interest saving alone (about $750,000 a year) is impressive.

Computer speed can also get you the facts you need hot out of the oven. You'll be making decisions on the basis of what's happening now, rather than on what happened three days, a week, or a month ago. You can schedule production on firm orders, not on a sales forecast. You can get daily—or even "on command"—reports of inventory in process. And the information will come to you presorted. The report will contain only deviations (or everything, with the deviations flagged for you) and the reasons for them—machine breakdown, a surge of orders, rush jobs, labor inefficiency, and so on. You'll know why and where the parade is being held up, and who is responsible. And you'll know it pronto.

Pitfall: Speed, too, can be misapplied, and it's costly. Once you work payroll down, say, from several days to one, does it really matter whether it takes 6 hours or 30 minutes—or, as one card-pusher boasted, a fifth of a second per man? None of your workers is in *that* big a hurry on payday.

To control the temptation to use the computer for fast reports that aren't really needed promptly, ask: Is this report really needed quickly, or will it just lie on a desk for two days before any action can be taken on it? Can input data be made available fast enough? Can input errors be controlled if you speed things? Will the computer schedule permit doing the report promptly?

The worst reason for buying speed is for prestige, but a number of companies have done just that. They have not only bought unjustified computers, but also interfacility Teletypes, elaborate paper-tape and leased-wire communications systems, etc. But the action that must be taken can't get under way any faster than before, because of other factors, such as an ordinary backlog of orders. This sort of thing is crushingly expensive public relations. Final irony: These firms are being laughed at, not admired. Don't pay for speed you don't need.

RANDOM ACCESS

This is the feature of being able to demand, at any time, any piece of information stored in the computer, and to get your answer in a flash. It can be a very useful gimmick. You can learn to the penny how much you've spent on an item in production, right up to the minute. You can learn it fast, too—while the canceling customer is still on the phone. Or you can learn the exact status of some item of inventory, as of a given moment.

Even without this interrogation feature, random access has a lot of value. It saves a great deal of expensive computer time that the machine might otherwise spend in laboriously searching magnetic tapes—for instance, in hunting for the data it needs to complete a calculation.

Pitfall: There's a strong temptation to plug in this kind of fashionable gimcrack when it's not really needed. Is the justification based on sound reasons or just excuses to buy? Be sure nobody is kidding himself. These toys are expensive.

PROGRAMED OPERATION

The real key to the value of computers is their ability to perform automatically a sequence of operations, and even to select internally which of several sequences should be followed when certain conditions show up. Without this ability, all the speed and storage capacity would be useless, because some clerk would have to give the computer a new command at every step, or be rushing around the room grabbing armfuls of punched cards to feed it for the next step. All you'd really have is a calculator.

A sequence of computer instructions is called a program. Small computers are usually programed externally. That is, you set up the program by plugging little "golf tees" or patch wires into a control board, which is then put on the computer. This procedure is economical and reliable, and reserves the storage capacity for information.

The more sophisticated computers are internally programed. That is, the instructions—on punched cards, magnetic tape, or what have you—are fed into the computer and stored internally. The larger storage capacities of these machines can absorb much more complex programs than the small computers and still have room for the information to be worked on. You can even instruct these computers to modify their own programs as they go along. Programing gives computers tremendous versatility.

There are several pitfalls associated with this programed operation feature. For one thing, an error—that somebody might catch if the work were being handled by layers of clerks—might go undetected, and swiftly spread through the whole operation. For another, it's difficult to take over manually in case of a power failure or other malfunctions. You can't easily tell where the machine left off—what step it was on at the time. Still another disadvantage is that this automatic operation is so fast, the computer can easily process cards about a thousand times faster than they can be prepared. It's like trying to feed a refinery with an eye-dropper. Even if you have a jungle of satellite equipment, a computer is so much more powerful than the people using it that the tail may not only wag the dog, but shake it silly.

We could go on and on with this sort of evaluation of computer features, but the point has already been made: The very things that make a computer great carry the seeds of disaster. They're mighty machines—but far from being almighty.

Computer, resplendent with its familiar dials, buttons, and lights, gets human starting signal from operator.

Computers in the small company

In the really small businesses, records, reports, and related procedures are not much of a problem. One or two men get all the information, make all the decisions of consequence. Even if they could get a computer for $1.98, they couldn't generate enough data to keep it busy.

But as the business grows the problem can intensify fast. Even so, small companies are seldom typified by routine. A kind of free-wheeling set of communications procedures is more usual.

Companies of this kind are in the most vulnerable position of all. A very small one knows it can't use a computer. A larger one *might* be able to. But instead of taking a close look, an enthusiastic president —proud of being a man of action, fond of getting the jump on his competitors—decides to "get a computer," partly for its prestige value. This can be a serious, if not a mortal, error.

Small companies, especially, should go slowly in the computer area. A computer will change a lot of things in a company—organization, custom, procedures, perhaps even employment. And a machine of any size has a stupendous appetite for cash. This is not something you try, like a propane lift truck. It's either successful, or else . . .

Computer manufacturers have recognized the plight of the little guy, and have come up with two answers. The first, of course, is a series of baby computers. Don't underrate these little computers. They are powerful. Ten years ago, comparable hardware would have filled a room.

The second solution consists of spreading the cost of computers among several users. This can take a number of forms. Most popular are the regular service bureaus spotted all over the country. (You can get wired in to one if there isn't one in your immediate area.) These people operate like Chinese laundries. You send your material in, they take care of it, and send it back ready to use. These service bureaus usually have the very latest equipment, and they'll keep your data completely confidential.

Then there are the new Data Centers being set up in many cities by the equipment manufacturers. These are more like coin-operated laundromats. You come in and use the machines yourself—for a fee. Help is available in most cases to get you started.

Finally, there are cooperative private ventures. Two or more companies go together on a machine and split the cost according to their share of the machine time and benefits. A few companies will sell "spare" time on their own machines, which they use most of the time. Rates are generally lower than those of a commercial house, but you're pretty much on your own. And if the owner gets a crash job, or his machine goes on the fritz, you're out of luck.

There are advantages and disadvantages to all these outside services, of course, but one or another may be just your ticket. If the small company has an eye on its own computer in the future, the best deal is probably the U-drive-it Data Centers, where the company people can learn under experts.

Time for a fresh look

There are a number of things that have changed in recent years, which make it important for you to bring yourself up to date on computers.

First, they've become cheaper—a whole lot cheaper, considering what you get. Small, economical computers have been specially developed to serve smaller businesses.

Second, they've become much better—far more reliable, simpler to operate, more powerful, more rugged, more adaptable. Instant random access to information is now possible. Both input and output are faster than before—and these used to be serious bottlenecks.

Third, they've become more popular. Companies that have computers have a definite edge over those that do not. Computers are giving managers more

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information faster, and in a superior form than their competitors are getting. It's reflected in efficiencies, profit margins, nimble adjustment to trends.

There are now 541 large computer installations, up 71% over last year. Over 2400 small machines are operating, up 76% in a year. Medium computers are up a whopping 88% since last year, now number better than 650.

Fourth, more companies are making computers. The fierce competition gives you several benefits. You have a much wider choice, more features. The prices are being trimmed. (Latest of several reductions was National Cash Register's cut of 25%.) Better service and more help is being offered by the manufacturers. Feverish research is going on to bring further improvements. The computer builders are offering more accommodations to customers—data centers to help you, and a new policy of basing your rent on so many hours per month, rather than assuming a full day of eight consecutive hours.

Fifth, most manufacturers now offer transistorized computers instead of those with old-fashioned tubes. Why is this important? Transistorized computers are as rugged as a rock (former versions had to be babied). They're extremely reliable—maintenance and downtime are nil. The new devices are faster and more versatile. You can do a great deal of formerly uneconomical or unfeasible work with them. Transistorized machines are much more compact and often have more storage capacity. They don't require elaborate air conditioning and huge power supplies. This gives lower installation and operating costs.

Finally, more improvements in computer technology and utilization are on the way. The more you know about what's going on in this industry, the better you'll know when it's time for your company to jump in. Here are a few coming improvements:

- Cheaper random access to more information.
- Far more sophisticated input devices.
- Graphic presentation of output information. (You'll get graphs or TV pictures instead of dead columns of numbers.)
- Cheaper, better cross-country communication.
- More packaged programs, program libraries, data centers, and other assistance.
- Advances in programing, making it easier and quicker, permitting non-specialists to do it.
- Greater memories (chemical and film storage).
- Photo sensing, etc., may supersede cards.
- Faster, more accurate output devices.
- Drop in costs, perhaps by three to one.

In short, computers are very good now, and they're getting better. Stay informed about them.

People are the problem

As we've hinted all through this piece, putting in a computer is no bed of roses. There have been failures of every kind, ranging from disappointment that the big promises didn't prove out, to scrapping multi-million-dollar programs and sending the computer back to the manufacturer. The single largest cause of failure is people. It shows up in:

- Inadequate planning.
- Distrust, misunderstanding—even fear.
- Shortage of people who know computers.
- Empire building and politics.
- Undefined or poorly defined objectives.
- Resistance to change.
- Lack of performance standards.

And, of course, that lovely computer programer you hired away from IBM leaves in the middle of all this to have a baby. But you *can* do something about *some* of these.

Inadequate planning is common. Some companies limit their planning to figuring out how to capitalize the hardware. A computer will change the old organization. There is a great deal of meticulous preparation that must be done. A thorough systems evaluation and redesign are necessary. Nothing can be mechanized that cannot be precisely defined.

Don't attempt too much at once. The men responsible for the compute. must manage by objectives, and set achievable goals and benchmarks within those objectives. There must be careful job definition and training. Dual systems may be necessary during the shakedown period as a check on the computer. Throw curves at it to see if it will catch preposterous information. If a tabulating system is in use, it must be carefully phased out.

Somebody will have to follow up, too, and this must be planned for and scheduled. For example, payroll is often the first routine to be put on a computer. It's simple to convert and is a good teething ring. But it's usually uneconomical, so plan when it will be taken *off* the computer and replaced with machine loading or inventory control. Otherwise, you will exhaust your capacity on little ornamental jobs and will have to work more shifts or buy more hardware to do what's really important.

The other side of the coin is that poor planning may also result in idle machine time—which can be an even more serious problem.

Distrust and misunderstanding are almost inevitable. People have read too many gee-whizz articles about computers, and they've heard some computer jargon, loaded with science fiction terms: complicated expressions like "bi-quinary coding." They've heard that the new machines read, write, and make decisions.

On the other side, you have the scoffer: "I'm not going to turn my business over to that jukebox!"

Overcoming this kind of misunderstanding is a matter of education. First thing to do is get rid of the hocus-pocus ideas. If a computer reads and writes, so does a Teletype machine or a tabulator. A computer can make certain decisions of a semi-clerical nature, but it's always on the basis of a

mechanical or electrical condition, not on the basis of judgment. Does water *decide* not to run through a pipe when the valve is shut?

The skilled labor shortage in the computer field is gradually coming under control. Two forces are at work—the supply is growing as more schools and manufacturers train specialists, and the demand is being slowed by new machines and coding systems that permit non-specialists to do the programing. But it's still a problem, so provide for hiring or training the computer specialists you need.

Empire building and politics can quietly rob a company of most of the gains a computer should bring. There may be jurisdictional disputes, with the comptroller suddenly finding himself in charge of—or performing—tasks like production scheduling, sales analysis, purchasing, inventory control. It isn't easy to head off these high priest situations, but it's well worth the effort.

Here's another type of political problem that can lead to resentment and obstructive tactics: The VP of sales in a major manufacturing company had been telling the other officers for years that it would be silly to charge their customers demurrage for railroad cars not unloaded promptly. The executive assured everyone that the lost revenue didn't amount to more than $50,000 a year, and that the good will gained was cheap at that price. A computer demolished him later by finding that the lost money came to over $250,000 a year. A computer will always put its unemotional finger on the exact source of trouble and inadequacy, no matter who gets embarrassed.

But most of the political problems stem from the fact that the computer addicts are usually eager young Turks who chaff at the company's sacred cows. The comptroller, chief accountant, and others opposing radical change are generally older, more realistic—and may have a certain pride of authorship in the present system. Both can contribute a great deal, of course, but unless somebody arbitrates, the entire program may be scuttled.

Ill-defined objectives are one of the largest sources of trouble. Things are not going to somehow get "better" as soon as you plug in a computer. It must be agreed upon well in advance just what "better" *is*—what's expected, what will be achieved, in what order of priority, and by approximately what date. Pin down exactly what improvements you want and where. Don't be vague or all-inclusive.

A timetable of some kind is important. This not only provides a realistic set of benchmarks, but can help minimize the friction that's liable to show up shortly after you get your computer operating. Otherwise, people may expect instant results (even though they don't know what these hoped-for results should be). Tempers may flare over delays in getting reports and statements—especially if communications with customers are involved.

Everything can't be done at once, and every new application or report preparation has to go through its own period of debugging and growing pains. The people affected must be kept informed of what's being done at this time, so they'll have confidence in the machine, in its staff, and in the outcome.

Resistance to change has bogged down many a computer project. Inertia, self-satisfaction, fear, and insecurity show up whenever a comfortable routine is disrupted. Let's focus on the *special* reasons for resistance that show up when the president comes home with a computer under his arm.

A computer is a pretty severe creature to work with. It not only exposes mistakes no matter who made them, but it can often hang a dollar sign on the mistake for everybody to see. And it wants everything just so. It puts out information in some fixed form and format. No longer can a department head decide these things arbitrarily. Once the form of a report is agreed upon, that's it. No more little individual differences here and there.

If the computer is used properly, it will take over certain routine—but sometimes important—decisions. If a manager has misgivings about this, or doesn't trust the accuracy of the machine, he's going to grumble. Moreover, these are often the kind of decisions some managers enjoy making. But no soap; the computer takes over the easy decisions and leaves management with just the tough ones.

Since the computer can out-remember and outsort a human, it will edit a lot of detail, circulate only those items needing attention, or that are needed for operating the plant. Everything else will stay stored in the machine—available, but not regularly distributed. Most managers will cheer over this—they'll be getting all the information they need without any time-consuming chaff.

But some managers really *enjoy* getting a lot of paper. It makes them feel—and their desks look—important. They may even like to pore over all the supporting detail with a meticulous eye, perhaps triumphantly finding a misspelling now and then. The computer will rob them of half their kicks.

Lack of performance standards has been an almost universal vexation. Management seems to have been hypnotized by the plush computer showrooms, the fancy job titles, the phenomenal accomplishments of computers. Perhaps some have felt too poorly informed to interfere with the operation. No doubt part of the difficulty is the traditional indifference of management to data processing. It is this indifference that led to the common situation of the data processing group setting its own methods, standards and objectives—and judging itself—before computers came upon the scene.

Whatever the reason, management has often not been in control of the computer function. With nobody riding herd, and without management interest and support, it's not surprising that a number of promising computer projects run out of gas.

The obvious solution is for management to take an interest: to control the data processing and computer function as it does any other function. All that's needed is normal 3-D business sense:

1. Decide precisely what is needed or wanted.
2. Delegate responsibility for achieving it.
3. Demand progressive reports—and results.

This is a *short* answer to the problem of performance standards, but it's neither simplified nor simple.

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SYSTEMS NEED YOUR GUIDANCE

In a lot of companies, information handling hasn't really changed in years. As new data processing methods and machines were developed, the "progressive" companies hooked them on to the old patchwork system. As new information needs came up, they were added to the old system. Outmoded reports were seldom culled out, so the paper burden just grew—undirected, uncontrolled, even ignored.

If the data processing people tried to increase efficiencies, they met resistance at the department level. They had to "sell" everybody, which took more energy than the work they were supposed to do. And they carried very little weight. If they went to a top man for help, he was hardly a crusader. He was half ignorant of what was going on, not interested anyhow, and busy trying to shave another nickel off production costs, instead of hacking a fortune out of the paperwork that controlled it.

Here's a wonderful dodge that's used, now that management has become data conscious: the "step-by-step" approach to automating information systems. General idea here seems to be that you can't swallow an elephant whole. And, since the costs are terrific, you'd better be cautious and avoid mistakes.

This is sound thinking, provided: (1) you have an objective, (2) you know just where your systems need overhauling, and (3) you know how it's going to be done.

The trouble is, the "step-by-step" approach is sometimes just a new disguise for the old policy of plugging new machines into a decrepit system, without really having a hard look at the *system* being perpetuated.

Instead of a series of conservative steps toward a goal, you find a series of uncoordinated missteps, with no particular sequence and only a vague idea of what is wanted "in the future." So the program doesn't "step"—it just marks time.

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Too often, the step-by-step approach consists of just *replacing* one isolated step with another. This is exactly what has been going on all along, and what has led to the sorry collection of haphazard fragments that now constitute the general run of information systems. They have grown without organization, direction, or even relation to the business. Data processing has often assumed a role out of all proportion to its place in the organization. It's high time to harness data processing to the over-all information needs of the company.

A word is in order about the "industry specialists" that equipment manufacturers might send around. You can use their knowledge, just as you would a lawyer's, but don't let them take over. Some companies have turned their whole system analysis over to these people, which is like asking a pitcher to umpire the game. Not surprisingly, these men discover that they know of another situation "just like" yours, and that (will wonders never cease?) they happen to be selling just what the doctor ordered. They tend to take the path of least resistance, and work on the symptoms instead of on the problem. *You cannot get decent results by hanging new hardware on an old system.* You have to *engineer* your information handling system, just as you do your conveyor system.

Hardware—even data processing itself—is only a small part of an integrated information system. Iceberg fashion, the part you see is deceptive. The savings you make in the computer room, for instance, are only a fraction of the savings that a properly used computer can effect, all through the company. The same holds true even if your only data processing tool is a sheet of carbon paper.

The first step in improving any system is to find out what's being done now—and why. Obvious? Sure, but many companies pass up huge savings by not having a hard look at their information systems.

A systems analysis will save you money

It will do this, not only by underlining the ways in which improvements can be made, but also by heading off the installation of new equipment that isn't really needed. Time and again, for example, a company has overhauled its system to get ready for a computer, only to find it could make such major improvements in the system itself that it didn't need a computer at all. Most systems have been built up over the years in a kind of pot-pourri fashion, without much of a plan. As a result, duplication and inefficiency are inherent in most of them. A good survey will uncover a lot of weak spots.

There are other reasons, of course. An analysis will reduce the risk of costly errors by aggressive managers who are determined to "do something" about the paperwork problem, and go galloping off in all directions. It will pinpoint areas that lend themselves best to automation and show you where to move in, a step at a time, if you decide against an overnight revolution. It will lead to agreement on objectives and expected results. It will be perfect training for the men who will design the new system. It will establish a realistic timetable for changes.

A penetrating systems analysis and overhaul will also lead to the elimination of a bizarre situation that has grown up in some companies. These are the firms in which the data processing group enjoys the divine right of kings. It sets its own standards, judges itself, decides what information it will produce, for whom, when, and on what kind of machines.

The systems analysis should be made by an internal group headed by the best man available with top policy stature. This study will be no picnic; no one man can carry the ball, except in the smallest companies. To be effective, the study team will have to cross partitions, wander all over the organization chart, cope with resistance, probably make and change company policy. In a company of any size, there will be conflicts, power politics, friction, much of which will have to be resolved at top levels. Don't send a boy to do this job.

The man you choose will have to be able to coordinate the needs and contributions of everybody connected with the information pool. You can't have efficient over-all control information or efficient company operations, if every department head is an isolated little prima donna and runs his own show without considering the information needs of the whole company. This may be a grim pill to swallow, but it's the only cure for the headaches of inefficiency.

The manufacturing function must be represented and it must be *vocal*. If this job is done right, it will be of tremendous help to you. Not a shadow of doubt about it. But if you let the accountants and machine specialists run away with the analysis, you'll be no better off than before—maybe worse. These departments must be represented, of course. So must sales and the administrative staff. This has to be a company-wide project, with top-level backing and the support of every function that's affected. You'll probably have to compromise a little, move over now and then to accommodate the others. But drive a hard bargain. *This is one of the most important and far-reaching projects with which you'll ever be associated.* See that it's done right, that it benefits your operation, that you and your successors can live with it.

Who's responsible for this analysis? Usually, re-

sponsibility for the study is given to the comptroller's office. This can be a very questionable practice. By the very nature of the beast, comptrollers often find new ideas—and changes in general—pretty hard to swallow. They often have old allegiances to the accountants or financial people—or to both. They're busy with other things. And, like their compatriots, they tend to think of a system as an end product instead of as a means.

How about appointing a financial man? This can be a poor move, too. He's probably fond of his traditional role as keeper of the inner temple and may try to add the system to the other mysteries he controls. Accountants, then? They're familiar with systems and procedures, at least. And their insistence on clear audit trails may help keep people out of trouble—not to say out of jail. But remember where all the paper came from in the first place. And if these birds set up your present system, are they likely to admit that it's a sorry mess? Will the next one really be better, or will it just spread confusion a little faster? Sales and production men seldom have a broad enough knowledge of over-all company operations and the interplay of its parts.

Of course, in your particular company, any one of the people we've discussed might be just the man for the job. Point is, don't let the job be lightly handed out. The requirements are stiff.

Here's what your man has to do:

1. Guide a detailed systems analysis.
2. Throw out some established procedures.
3. Get widespread cooperation in the face of high-level resistance.
4. Keep a group with various backgrounds and biases working together.
5. Cross organizational lines at all levels.
6. Persuade people to change old habits.
7. Design a new system.
8. Select appropriate equipment.
9. Set up a training program.
10. Be sure the new systems are followed.

One solution that has worked well for some companies is to hire a professional with experience in systems analysis and design. Don't confuse this with a technician, or a machine specialist, or one of the high-priced floaters on the market. We're talking about a professional; a man who can be turned loose once he knows what you want. Naturally, this is an extremely rare species, but if you can find one, he's an A-1 investment. He'll sell ideas, which a team will not. Teams tend to mold around the firmest member, to bow and compromise all vitality out of anything controversial—as all change is. And a professional can afford to debunk opinions and procedures that are sacred—or are never given a second thought—as far as the company is concerned. He can cross company lines more freely than a company man can, and he has a better idea of what can and cannot be done for a given investment.

Using an outside professional has its drawbacks, too. He'll need help (so you can use him to train your own systems people). He may be resisted unless a top officer makes it clear the company is behind the study. And he may not know much about your operations. But there's a lot to be gained from using a *proven* consultant.

It must be conducted in depth

For the sake of this article, let's assume you're a typical plant operating manager. You are not in charge of overhauling the company's information handling systems, but you or your superior is on the steering committee that is midwifing the project. Here's what should happen:

The first step is to set down the responsibility and authority for conducting the study, for digging out the facts, crossing company lines, evaluating the present system, and designing a new one. A firm schedule is prepared for progress reports and for committee meetings to consider the suggestions and problems that the study group comes up with. A study charter is made up telling who, what, why, when, and how; the over-all objectives: and the necessity for full cooperation. This is widely distributed.

Now the study team goes to work. It finds out what information is now obtained, and how, and what would be useful if it could be had economically. When the team hits your operation, it will ask what you get, when, and why. What do you do with it? Where does it come from? Must it be in this form? What if you didn't get it, or didn't get all of it, or didn't get it as often? When do you put it to use?

Be sure you tell the team what happens in fact, rather than in the theory of some "official" procedure. Too much paperwork is dictated by custom, by ego, by present equipment, and by the tendency of accountants to ship out full supporting detail and by-products along with the facts you really need. As a result, more data are generally circulated than are necessary for efficient management control. Take a stern look at the paper you receive, and think about what you'd *really* like to get. This is the chance of a lifetime to lighten your reading load. Pounce on it!

From the report of the study group, the committee should be able to establish the information needs of the business and see where the present system is inadequate. The report should contain detailed information on data volumes and costs, processing time and methods, reports and forms preparation, data distribution and uses, and a rundown on information needed but not provided—or not provided in time to be useful. There should also be a detailed flow chart of the present system, complete with decision steps and clerical functions (you might be amazed at how many little judgments are made daily by clerks, but they must be taken into account). All exception routines must be set down in minute detail.

In reviewing this report, the committee must be on the lookout for superficial work. *Nothing can be mechanized that cannot be precisely defined.* The

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committee must also satisfy itself that things are really as represented. When the study group found that "everything was fine" in a certain department, for example, was it talking to the man that set up the procedures in effect there? Have any data been included under "useful" that are in fact only *desired* by somebody who regards a mound of reports as some sort of status symbol? Is anyone getting more detail than he now needs simply because he got it before he was promoted?

Here's one last caution for the committee: Don't get over-enthusiastic about all the unnecessary clerks you are going to free. The widespread expectation of saved labor is often unrealized and may make people cynical about the whole undertaking. Normally —except for insurance companies and large banks— "freeing clerks" is an invalid objective, for at least four reasons:

1. If there's a computer in your future, you'll need specialists like coders, programers, and perhaps a systems analyst. They're scarce and they're costly. One of them could offset several clerks.
2. You'll probably have a major training job on your hands.
3. During conversion of file information from documents to cards or tape, you'll need *more* clerks than before. This job can take many months, too.
4. You'll still need clerks, to punch and handle cards or tapes. And one card won't hold many data, so clerks must punch and verify heaps of them to capture any significant amount of information.

Your last step—good systems design

After a thorough analysis (and only then), you'll be ready for the final step in eliminating the information mess. This is the time to design a system that will really meet the information needs of the company. Here is where the spokesman for production will have to be on his toes. And he'll also probably have to step on a few other toes while he's at it. Somebody, missing the point of the whole project, is bound to insist on getting "at least as much as we got before" from the new system.

But if the new system is to be a real improvement, there will be fewer data and fewer and shorter reports being shuffled around. You'll be reading about the exceptions on which you must take action, rather than reading yourself blind just to find out that everything is fine. If your company is able to justify a computer, you'll be thinking about getting the routine decisions made for you, rather than getting reports upon which you must make the decisions.

The systems design people should also take into account the fact that each lower echelon needs more detailed information about a narrower area than does the level above it. Trick is to send each desk as little paper as possible *without shortchanging anyone.* Be on the lookout for detailed breakdowns—or even entire reports—that won't be needed any more; put every report through an inquisition before you plug it in. Seek out information you've always wanted but couldn't get under the old system. The information center ought to be a well out of which you can ladle the facts you need when you need them.

Agreeing upon the objectives of the new system will take time and effort. Some desired objectives are bound to conflict with each other, and their relative importance may change during the course of the study. Each objective must be examined carefully before it's incorporated into the new system. Maybe long-term goals will force the sacrifice of quick savings, but so will research and development or new machinery. And don't try to save a few thousand dollars by leaving out a useful report just because you "got along without it" before. The new system should give you better information, not just the old facts in a different form.

As the basic information needs of the business start to come into focus, another flow chart can be developed. Only this one should be based on *information* flow, not on paper flow or data processing procedures. Details of the old system may well be undesirable, so existing procedures should not be duplicated. Instead, use the old flow chart only to get a good grasp of information sources, present procedures worth saving, current and future needs, and where data volume is likely to increase. While the new system is being developed, the team should pin down just who in each box of the company organization chart will be the contact man for the central data processing group.

Armed with this information flow chart, specialists can now plan for mechanization. This is where some new resentment will show up. *Mechanization automatically means standardization,* whether it's in the office or in the plant. Everything—procedures, terminology, even the location of information on documents—must stay constant. Every time someone wants to do something the least bit different, he'll have to check with the data processing people. This can be irritating to men who have become used to doing things in the most expedient way for them. But the departments of a company are not little entities; they're part of an over-all organization. You couldn't have efficient production if every worker insisted on doing things his own way.

On the other hand, one of the most serious errors that can be made is to let the new system itself become rigid. Flexibility must be built into it.

Laws, products, technology, and people change, and so must the system, if it's to meet the needs of the company for any length of time. Information patterns should change every time the company, the industry, or the economy undergoes a major change. Keep the data processing machines and staff subservient to your information needs, or the inertia of the card pushers will rust out the whole system again.

You probably won't be concerned with the selection of hardware, but in case you find yourself on a steering committee some day, here are a few things to keep an eye on:

- Keep the pressure on the study team to force quick rejection of alternatives and to avoid academic probing. When an alternative develops weaknesses, drop it and go on to the next one. This is the only way you can control the costs and the time involved, since each successive step will require more detailed analysis than the previous one.
- Plan to have data captured in machine language the first time they are prepared. Cut out as much manual copying and editing as possible. This will save labor and errors.
- Don't under-rate the value of good forms design. A little attention to redesign here can often bring very handsome returns in itself. A small New York textile firm made a deep slash in its data processing costs by simply consolidating 16 different forms into a single format, with similar information in about the same location on each form. Consistent layout of information permits the use of carbon paper to prepare several different forms at once, and makes them all easier to read and use. And it saves labor. In another case, Ducommun Metals and Supply Company in Los Angeles recently revised its order entry and billing procedure—in connection with a general system clean-up—and pocketed a $30,000 annual savings, thanks largely to forms design.
- When the study team gets around to considering costs, there are a few more jokers hidden in the deck. Be sure these factors are figured in:

  Associated equipment (control panels, card files).
  Space renovation (is air conditioning necessary?).
  Freight and insurance on equipment.
  Conversion of present files.
  Operation costs.
  Training.
  Maintenance (contracted or internal?).
  Rental during shake-down period.
  Parallel operations during conversion.
  Salaries and special supplies.

You can't make a valid comparison of costs between the present and the planned systems until you have a good idea of what they are. Often, when all the costs are in, a company has to back off and take another look at its grandiose schemes. Nothing could be healthier. For example, an eastern cosmetics manufacturer decided to look over a computer. After the usual round of discussions, mouths were watering over the prospects for the future. But the cost was too steep. However, another look at the systems analysis made while getting ready for the computer saved the day. They found enough ways to revise and improve their systems to get the results they wanted without a computer—and at half the cost.

Thereby hangs a tale. More often than not, the big, juicy savings computer manufacturers like to talk about result more from system improvements made during the pre-installation studies than from the hardware itself. Keeping this one fact in mind might save you a fortune.

By now, it's probably obvious that overhauling your information handling system is a monumental undertaking. It consists of about 90% planning and 10% installation—or maybe no installation at all. It's a far cry from buying something to replace a few clerks, but immeasurably more effective. Good systems are the key to Controlled Plant Information.

For more help and background, consider these sources

Achieving Controlled Plant Information is a monumental job. You'll need plenty of information and assistance. Fortunately, there are a number of sources that stand ready to help:

The first sources, and the ones most conveniently available, are the specialists in your own company. Talk things over with them, discuss your problems and activities. The fact that you're interested in the information mess might easily lead to some informal benefits long before any comprehensive analysis gets off the ground.

Other companies are often good sources. Here you'll get tips learned the hard way by men that speak your language and understand your situation. Don't stick exclusively to companies in your own industry. Most information problems are universal. Hunt for ideas, don't try to copy systems.

Many universities have faculty specialists, hardware, training programs and publications at the disposal of industry.

Trade associations, the AMA, and the so-called professional societies are a mother-lode of information, usually based on the actual experiences of other companies. Conferences and seminars give you a chance to bounce your ideas off some keen minds that have considered the problems facing you.

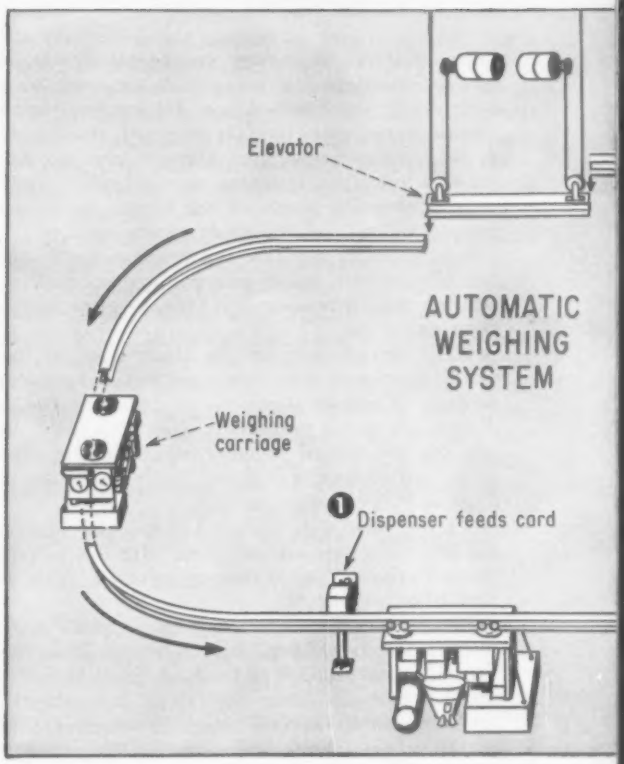
Consultants can be of tremendous value in this area. They have broad experience, specialized knowledge, an unbiased outlook, and the time to keep themselves informed. Several public accounting firms also offer consulting services in data processing. You might contact the Association of Consulting Management Engineers, Inc., 347 Madison Ave., New York 17, N. Y.

Equipment and forms manufacturers, and other supply companies are also good information sources.

Finally, there are a large number of books, magazines, and other publications for reference.

Any or all of these sources can take you a long way toward your goal: Controlled Plant Information.

At the start of the shift the foreman loads the dispenser with pre-programed cards. The cards take over, and for the next eight hours . . .



This pilotless weighing

In designing its new Worcester, Mass., grinding wheel plant, Norton Company put improved quality at the top of its requirements.

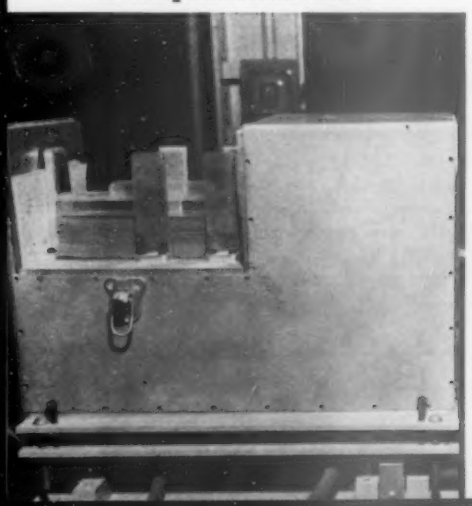
The result: a completely automatic, accurate weighing system for drawing abrasive grain and bonding material (see photos).

Because each order is customer tailored, the final mix of abrasive grains and bonding materials involves over 200 possible sources. The exact amount of each material is punched onto the cards by the production department's planning section before the cards are delivered to the production floor. There, the foreman plans his next 8-hour shift ahead of time, sorting cards into proper order for scheduling mixing machine operations at a steady pace.

At the beginning of the shift the foreman loads the dispenser with enough cards to keep the three weighing carriages and the nine mixing stations busy throughout the eight hours.

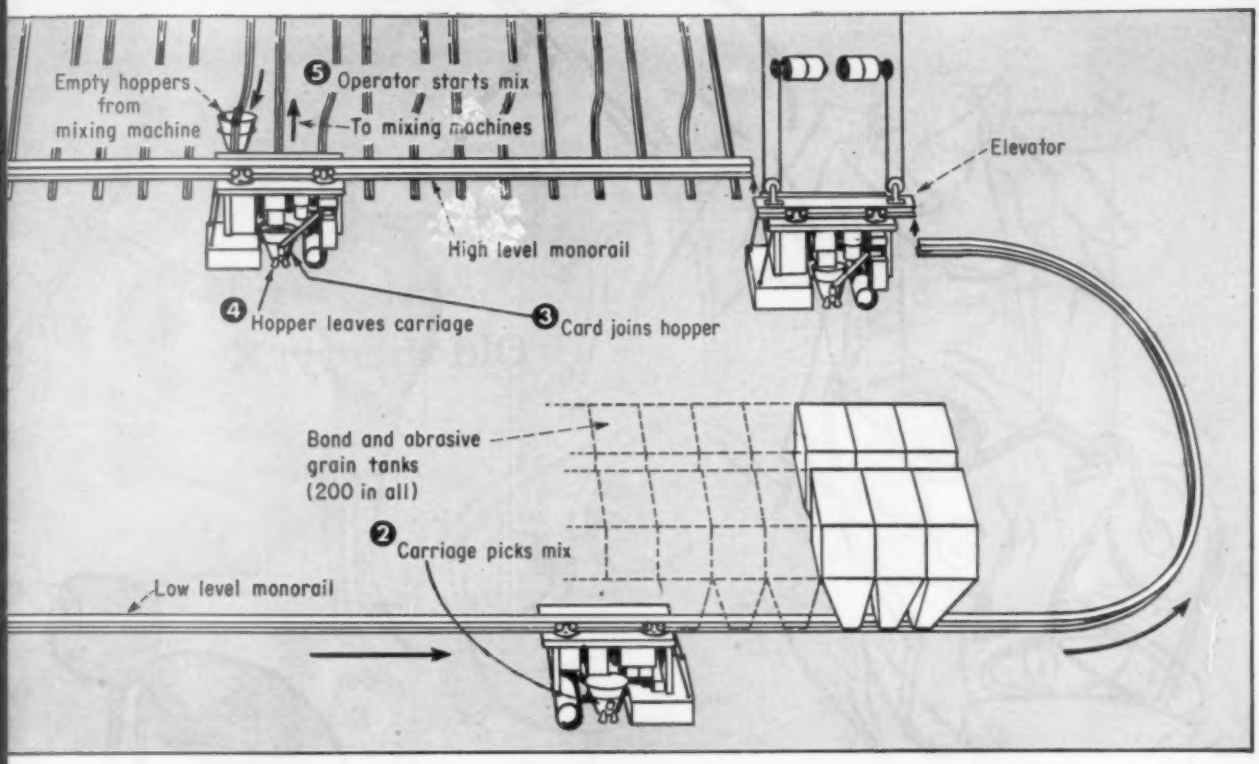
Loaded with punched cards, the dispenser issues a single card for each round trip of a carriage. Once card-fed, the carriage begins its unattended trip

1. Dispenser feeds card



2. Carriage picks mix

3. Card joins hopper



system insures quality results

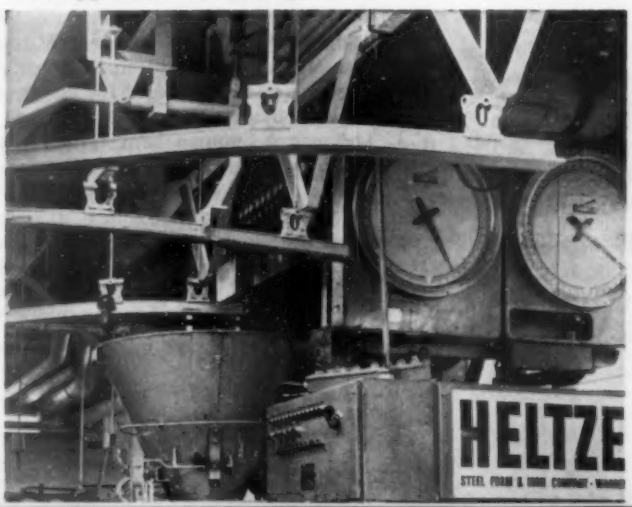
around the track, stopping at each preselected grain or bonding tank. Proximity heads on the carriage superstructure count off the tank markers. Magnetic brakes inch the carriage into exact drawing location.

When it's filled with all required grain and bonding material (2), the carriage travels to the lifting elevator. On the upper monorail (4), it travels to the selected mixing station. Here, a short section of rail within the carriage tilts, and the filled hopper rolls off to the mixing station. The card stays with the hopper and becomes both the instruction card and piecework coupon for the mixing operator. At a subsequent mix station the weigh carriage automatically receives an emptied hopper before dropping to the main track for another round trip.

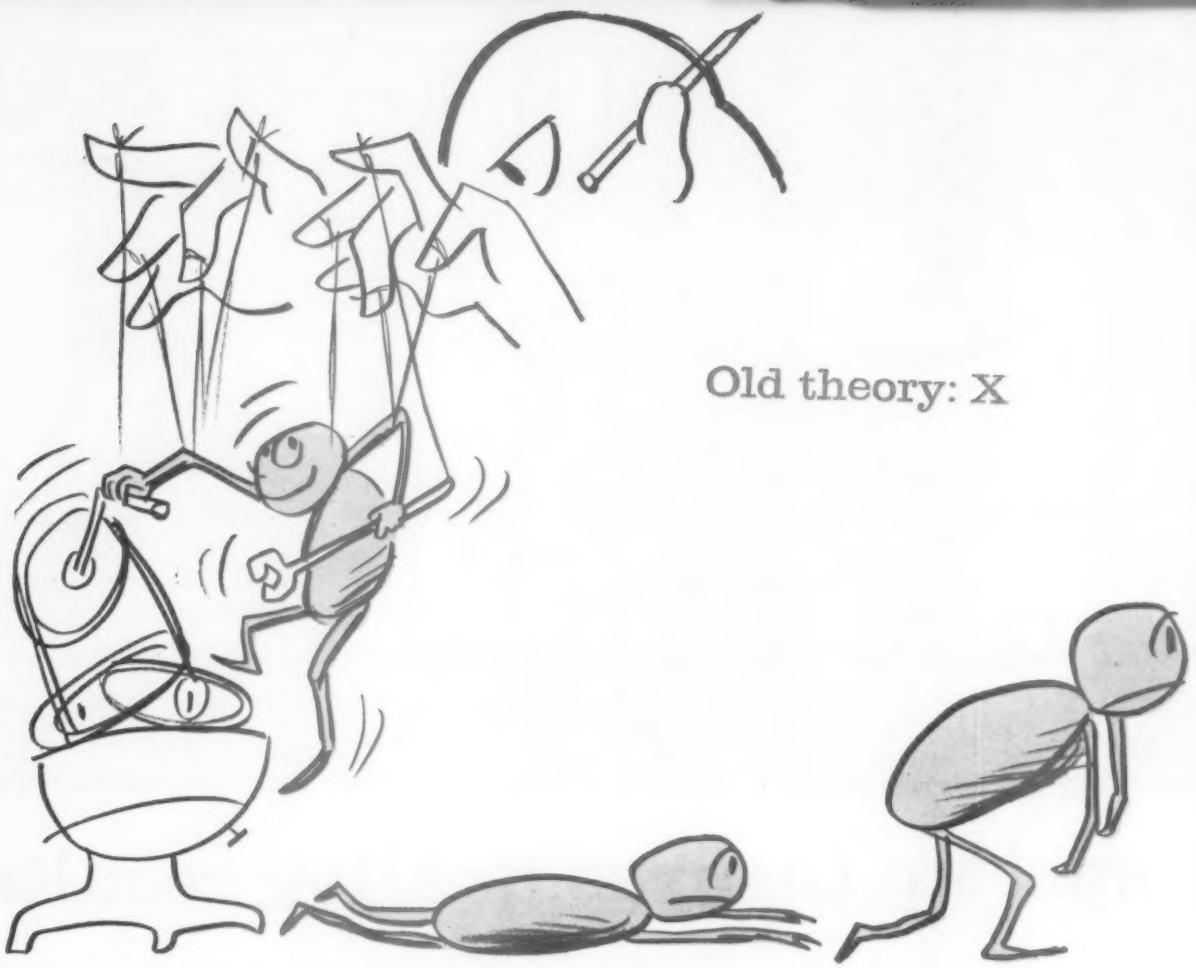
Lights mounted at the end of each of the three operating carriages activate an electric-eye control system designed to avert collisions.

The ratio of abrasives to bond material determines the "hardness" of the final grinding wheel. To achieve this correct mix, two scales are used for each material, one for coarse and one for fine.

4. Hopper leaves carriage



5. Operator starts mix



Old-style management thinking

Most of today's management thinking was forged to meet the needs of a feudal society.

The world has changed, and new thinking is necessary for top efficiency today.

That's the core of what Douglas McGregor, professor of industrial management at Massachusetts Institute of Technology, says in his insightful book, "The Human Side of Enterprise" (McGraw-Hill Book Company, Inc., 1960, 246 pages, $4.95).

In FACTORY's opinion, this book is an extremely important management document. It reaches to the heart of the problems of modern management. It clearly outlines a basis for achieving greater productivity and responsibility among working people today.

McGregor digs deep into management theory in his analyses of Theory X and Theory Y.

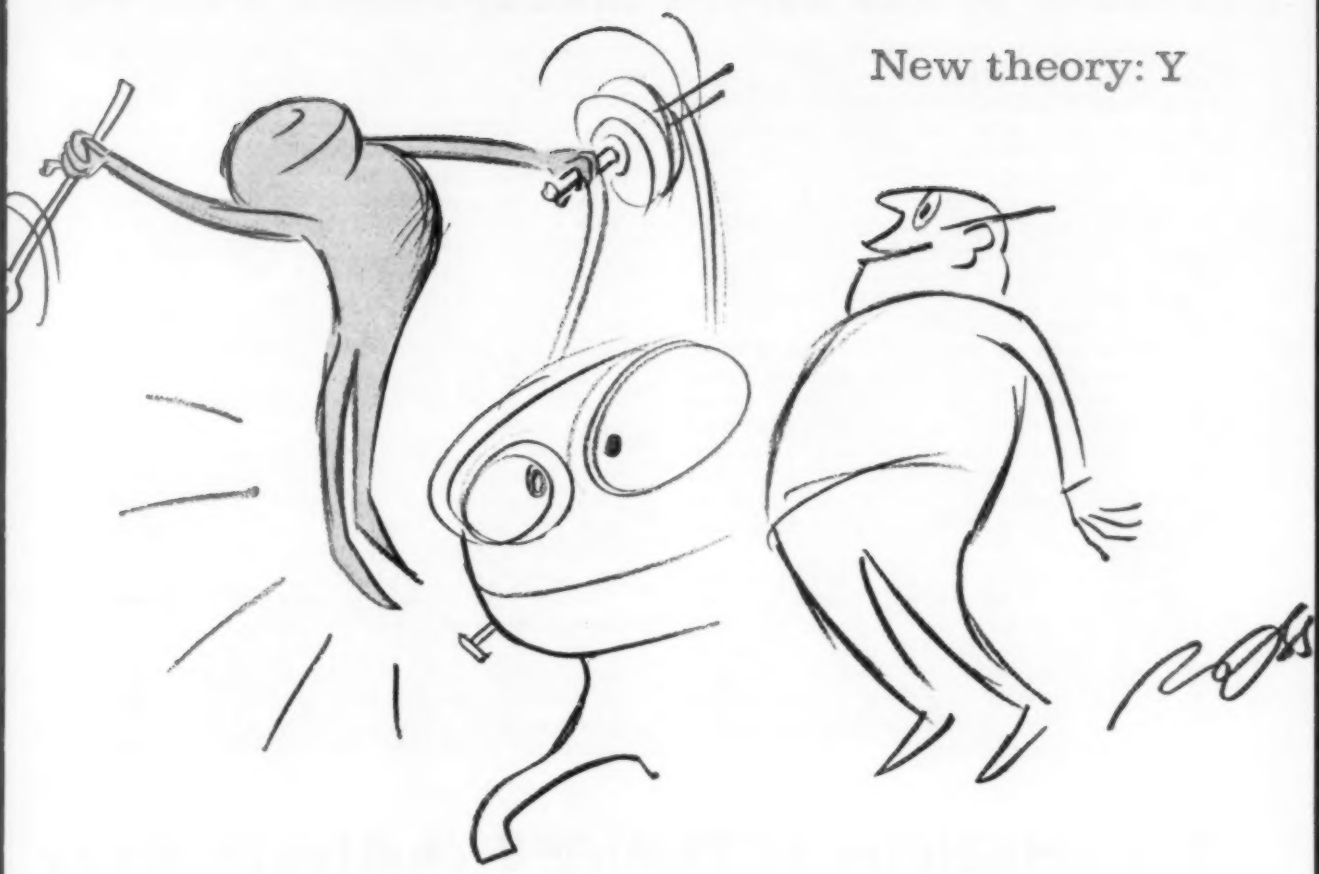
Theory X, the traditional framework for management thinking, is based on a set of assumptions about human nature and human behavior. The assumptions:

"1. The average human being has an inherent dislike for work and will avoid it if he can.

"2. Because of this human characteristic of dislike of work, most people must be coerced, controlled, directed, threatened with punishment to get them to put forth adequate effort toward the achievement of organizational objectives.

"3. The average human being prefers to be directed, wishes to avoid responsibility, has relatively little ambition, wants security above all."

Do these assumptions make up a straw man for purposes of demolition? No. While they are rarely stated so directly, the principles of organization that comprise the bulk of management literature could only have been derived from assumptions such as those of Theory X.



challenged by brilliant new book

Theory Y finds its roots in recently accumulated knowledge about human behavior. It is based on the following set of assumptions:

"1. The expenditure of physical and mental effort in work is as natural as play or rest.

"2. External control and the threat of punishment are not the only means for bringing about effort toward organizational objectives. Man will exercise self-control in the service of objectives to which he is committed.

"3. Commitment to objectives is dependent on the rewards associated with their achievement. The most important rewards are those that satisfy needs for self-respect and personal improvement.

"4. The average human being learns, under proper conditions, not only to accept but to seek responsibility.

"5. The capacity to exercise a relatively high degree of imagination, ingenuity, and creativity in the solution of organizational problems is widely, not narrowly, distributed in the population.

"6. Under the conditions of modern industrial life, the intellectual potentialities of the average human being are only partially utilized."

Under the assumptions of Theory Y, the work of the manager is to integrate the needs of employees with the needs of the enterprise. Direct control is only rarely appropriate. Here are McGregor's words:

"The industrial manager is dealing with adults who are only partially dependent. They can—and will—exercise remarkable ingenuity in defeating the purpose of external controls which they resent. However, they can—and do—learn to exercise self-direction and self-control under appropriate conditions. His task is to help them discover objectives consistent both with organizational requirements and with their own personal goals. And to do so in ways that will encourage genuine commitment to these objectives. Beyond this, his task is to *help* them achieve those objectives: to act as teacher, consultant, colleague, and only rarely as authoritative boss."

Turn the page

...Theory X has served management well, but

The assumptions of Theory X would not have persisted—and would not have succeeded in bringing us to this state of industrial development—if there were not some truth in them. But today's knowledge of behavior and motivation goes beyond those time-honored assumptions.

McGregor says this about motivation:

"Man is a wanting animal—as soon as one of his needs is satisfied, another appears in its place. This process is unending. It continues from birth to death. Man continuously puts forth effort—works, if you please—to satisfy his needs.

"Human needs are organized in a series of levels. At the lowest level, but of greatest importance when they are thwarted, are the physical needs." (Needs for food, drink, shelter—the things money can buy.)

"A satisfied need is not a motivator of behavior! This is a fact of profound significance. It is a fact which is unrecognized in Theory X and is, therefore, ignored in the conventional approach to the management of people.

"When the physical needs are reasonably satisfied, needs at the next higher level begin to dominate man's behavior—to motivate him. These are the safety needs: for protection against danger, threat, deprivation. Some people mistakenly refer to these as needs for security. However, unless man is in a dependent relationship where he fears arbitrary deprivation, he does *not* demand security.

"When man's physical needs are satisfied and he is no longer fearful about his physical welfare, his social needs become important motivators of his behavior. These needs are for belonging, for association, for acceptance by one's fellows, for giving and receiving friendship and love.

"Above the social needs—in that they do not become motivators until lower needs are reasonably satisfied—are the needs of greatest significance to management and to man himself. They are:

"1. Those that relate to one's self-esteem. Needs for self-respect and self-confidence, for autonomy, appreciation, competence, and knowledge.

"2. Those that relate to one's reputation: needs for status, for recognition, for achievement, for deserved respect."

Because of our laws, economic prosperity, and the power of workers to influence public and business affairs, America today is not always a satisfactory place to practice Theory X. It seeks to motivate by appealing to lower level needs—which, in American workers, are often satisfied.

Theory Y is really new. It's more than the "human relations approach." Says McGregor:

"We have now discovered that it is no answer to simply remove control. Abdication is not a workable alternative to authoritarianism. We have learned that there is no direct correlation between employee satisfaction and productivity. We recognize today that

The principles of Theory Y challenge many

Following are excerpts—taken out of context—from Author McGregor's 246 pages of carefully reasoned argument on "The Human Side of Enterprise":

• **"Scanlon Plan managers reveal, by their examples and attitudes, that authority in the conventional sense is not the method of control on which they rely.** Persuasion, logical argument, professional help, the joint recognition of the objective requirements of the situation—these are the influences that determine their behavior and that of the members of their organizations.

• **"Leadership is not a property of the individual, but a complex relationship among variables.** There are at least four major variables now known to be involved in leadership: (1) the characteristics of the leader, (2) the attitudes, needs, and other personal characteristics of the followers, (3) characteristics of the organization, such as its purpose, its structure, the nature of the tasks to be performed, and (4) the social, economic, and political *milieu*. The personal characteristics required for effective performance as a leader vary, depending on the other factors.

• **"Participation which grows out of the assumptions of Theory Y offers substantial opportunities for ego satisfaction for the subordinate and thus can affect motivation.**

"The subordinate can discover the satisfaction that comes from tackling problems and finding successful solutions for them. This is by no means a minor form of satisfaction. It is one of the reasons that the whole do-it-yourself movement has grown to such proportions in recent years. Beyond this, there is a greater sense of independence and of achieving some control over one's destiny.

• **"The principle of integration requires active and responsible participation of the individual in decisions affecting his career.**

"Perhaps the biggest change required in current practice with respect to promotion and placement—if we desire to utilize the principle of integration—has to do with the relation of the 'candidate' to the process. Today he tends to be a pawn on the organizational chessboard. Plans are frequently made with respect to his career which may have profound effects upon his most important goals and needs. Yet he is likely to have no voice in these plans and to remain in complete ignorance of them until after the decision has been reached. Moreover, the organization's needs are given priority almost without consideration of his needs.

• **"The principle of self-control requires that staff groups provide data and reports to members of the organization for controlling their own—not subordinates'—jobs.**

"The appropriate role of any major staff group is to provide help to all levels of management.

Theory Y could serve future needs better

'industry democracy' cannot consist of permitting everyone to decide everything, that industrial health does not flow automatically from the elimination of dissatisfaction, disagreement, or even open conflict. Peace is not synonymous with organizational health; socially responsible management is not co-extensive with permissive management.

"Above all, the assumptions of Theory Y point out the fact that the limits on human collaboration in the organizational setting are not limits of human nature but of management's ingenuity in discovering how to realize the potential of its human resources.

"Theory X offers management an easy rationalization for ineffective organizational performance: It is due to the nature of the human resources with which we must work.

"Theory Y, on the other hand, places the problems squarely in the lap of management. If employees are lazy, indifferent, unwilling to take responsibility, intransigent, uncreative, or uncooperative, then Theory Y implies that the causes lie in management's methods of organization and control."

Companies that operate under the principles of the Scanlon Plan use Theory Y. The plan is not a pat formula, but has two major elements:

1. A means of sharing the economic gains from improvements in organizational performance—in other words, a form of profit sharing.
2. A means of providing every member of the organization an opportunity to contribute his brains and ingenuity, as well as his physical effort, to the improvement of organizational effectiveness.

Says McGregor:

"We hear a great deal of talk about improved productivity and its significance in our economic picture. Many of those who talk the loudest conceive of productivity solely in terms of the physical output of production and clerical workers: 'If such people would only do more of what they are told, productivity would rise and the economy would be better off.'

"It is a true virtue of the Scanlon Plan that it scraps completely this narrow and insulting conception of the worth of the human being in the industrial enterprise. Productivity is seen in terms of the overall effectiveness of the organization, and everything that contributes to it is valued. The distinctive potential contribution of the human being in contrast to the machine, at every level of the organization, stems from his capacity to think, to plan, to exercise judgment, to be creative, and to direct and control his own behavior. In contrast to the philosophy of traditional incentive plans and the conventional practices of industrial engineering, the Scanlon Plan encourages the distinctively human contribution."

Large and small companies—with and without unions—have applied the Scanlon principles. They have prospered in good and bad times. By and large, they have out-performed their industry averages.

present-day management techniques

"The provision of professional help is a subtle and complex process. Perhaps the most critical point—and the one hardest to keep clearly in mind—is that help is always defined by the recipient. Taking an action with respect to someone because 'it is best for him,' or because 'it is for the good of the organization,' may be influencing him, but it is not providing help unless he so perceives it. Headquarters staff groups tend to rationalize the effects of many of their activities on the field organization in a paternalistic manner and, as a consequence, fail to see that they are relying on inappropriate methods of control.

• **"The semi-annual or annual appraisal is not a particularly efficient stimulus to learning.**

"It provides 'feedback' about behavior at a time remote from the behavior itself. People do learn and change as a result of feedback. In fact, it is the only way to learn. However, the most effective feedback occurs immediately after the behavior. The subordinate can learn a great deal from a mistake or a particular failure in performance, provided it is analyzed while all the evidence is immediately at hand. Three or four months later, the likelihood of effective learning is small.

• **" 'Selling' management a program of target setting, and providing standardized forms and procedures, is the surest way to prevent the development of management by integration and self-control.** The manager who finds the underlying assumptions of Theory Y congenial will invent his own tactics, provided he has a conception of the strategy involved. The manager whose underlying assumptions are those of Theory X cannot manage by integration and self-control, no matter how many different techniques or forms are provided him.

• **"Many problems cannot be solved on an individual basis or in two-person relationships. Some activities are appropriate to larger groups.**

"If we take a balanced and reasonably objective view of the large body of research evidence available on group behavior, certain things are clear. First there are no mysterious and secret skills which will enable the 'expert' to manipulate groups toward his own ends.

"Despite the rantings of a few 'converts' the field is not a cult. It has its own jargon, but consider in comparison the vocabulary that has grown up within the missile field in the past decade! . . .

"Groups can be effective decision-making and problem-solving entities. All the arguments to the effect that 'only the individual' can be responsible, make decisions, or innovate, are shibboleths.

"The fact that many, or even most groups do not do these things well proves nothing but our lack of knowledge about group behavior and our lack of skill in operating within groups."

WANT BETTER MAINTENANCE? ASK THE MAN WHO KNOWS

An Editorial Commentary

BY CARL G. WYDER
SENIOR EDITOR, FACTORY

As a graduate mechanical engineer, Carl G. Wyder worked for 20 years in various areas of plant operations before joining FACTORY in 1943. Each year since then has added to his stature as one of the prime forces behind today's concept of maintenance management.

Want to find out how to get more out of your maintenance department? Ask your maintenance head. He may be shocked by your directness at first, but when he realizes that you really mean business, he'll bare his soul. In fact, you'll probably be more surprised with your maintenance man's answers than he will be with your question.

Why do I say this? My reasons come from a small industry-wide sampling FACTORY recently made among 35 maintenance managers. They represented both small and large plant maintenance functions.

In this sampling we asked: What three things do you need most from top management? The answers can be sorted into nine main themes. They range in number of votes from 18 each for the two leading "needs" down to three votes for the one considered least important.

If you're apprehensive about being bombarded with the "we-need-more-money" plea, forget it. The survey just didn't point that way. Of course, our respondents agreed that good maintenance needs adequate personnel—it was the fourth "need" in order of popularity. And they agreed that a good program needs an adequate maintenance budget—but it rated fifth. Let's look at the three top vote-getters, which were far and away above all the others. We have grouped them like this:

1. Needed: recognition of the importance of the maintenance function. The respondents' comments indicated that two-thirds did not enjoy such recognition. For example: "I want more recognition as a department that is useful and necessary, not just toleration . . . Top management should consider maintenance as part of the production team, not as an overhead just to fix breakdowns . . . We need recognition as a member of management, which is our rightful place in the plant organization."

2. Needed: better understanding of maintenance management problems by other plant people. The consensus of replies was that production people made it hard for the maintenance manager to do a good job. For example: "Stop constantly pushing us into haphazard repairs to meet shipping schedules . . . Give us better cooperation in scheduling maintenance jobs . . . Realize the advantages of overhauling equipment during slack production periods as opposed to manpower layoffs."

3. Needed: more maintenance participation in over-all planning operations. This area was a close third with 16 mentions. The maintenance managers we interviewed apparently felt they were being ignored in the planning of facilities for which expensive repairs or alterations might have been avoided had they been consulted earlier. For example: "I want to be in at the start of all changes of manufacturing methods . . . Tell us about future plans affecting maintenance activities . . . Discuss all projects with us, to avoid costly mistakes and problems . . . Consider maintenance when purchasing new equipment."

Is there any significance in the fact that half of all responses were bunched in these three categories? I think so.

True, a few men asked for better facilities, or more manpower, or wider authority for expenditures. **But the weight of the top three responses suggests strongly that maintenance managers view their chief problems as those of lack of proper status in the management hierarchy and need for better recognition of their function by production people.** Said one maintenance head recently: "I'll bet the plant manager doesn't even know my name." An unusual comment? No, FACTORY editors, too, have noticed this at times during plant visits. (Incidentally, is your plant maintenance head known?)

How then do you get more out of your maintenance department? Simple. Employ modern maintenance management. But first make sure your maintenance head has the climate of status and respect due him as a manager. How he gets it is top management's responsibility. That means you.

BIG PLANT BIG IDEAS

Building big, custom-engineered equipment creates big problems—problems that only big thinking will solve.

That's how it was when Allis-Chalmers (Terre Haute, Ind.) designed and built the facilities shown on these pages. The big products are power transformers and circuit breakers. The big problems were:

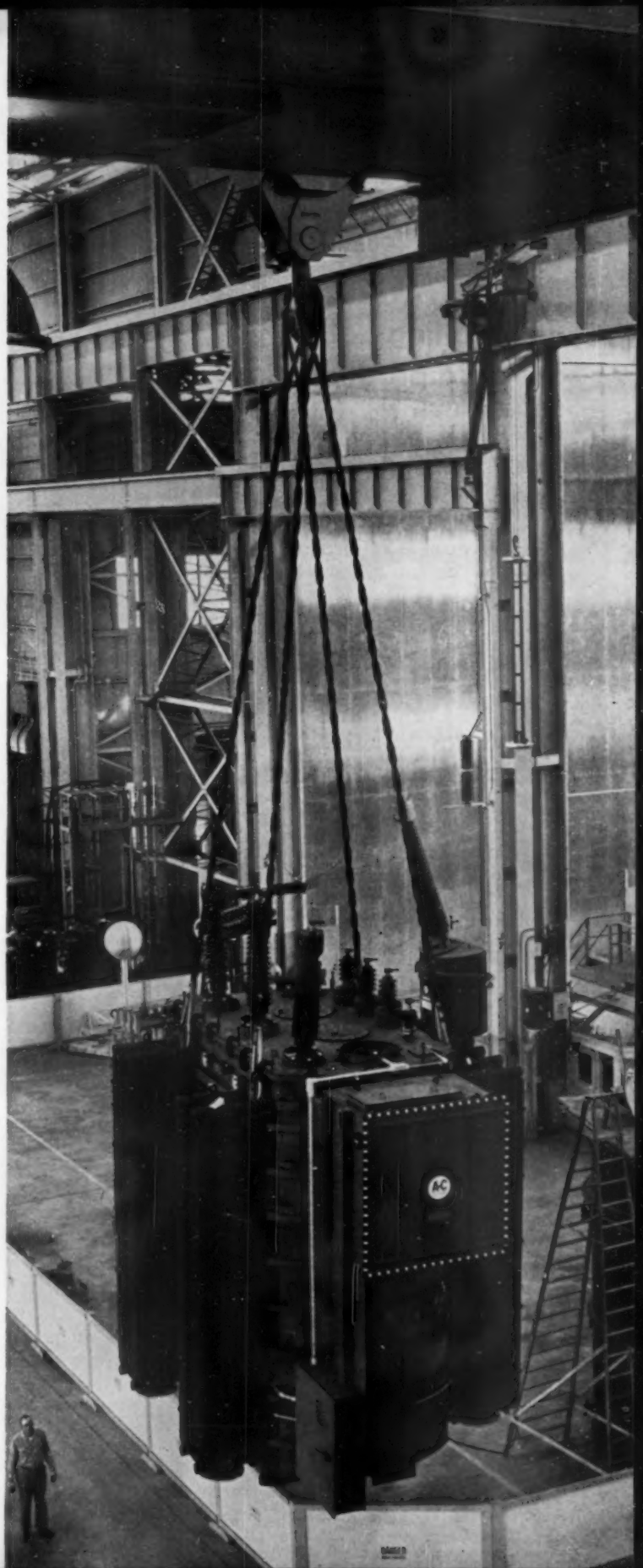
- Costly inventory of work-in-progress.
- Elaborate quality control procedures.
- High set-up costs and one-shot "runs."
- Mechanical material handling.

A-C plant designers built in the solutions to these king-sized problems.

For example, quality control considerations seldom dictate plant layout and design, but that's exactly what happened here. The necessity for elaborate final testing of transformers prompted A-C to establish these facilities first, then draw the manufacturing area around them.

All areas are blanketed with overhead cranes to ward off headaches in material handling. Several cranes are much larger than present products require, to allow for the industry trend to larger units.

A number of the shrewd ideas used at A-C can easily be adapted to other plants —perhaps yours. The following pages show a few. Good hunting.



Huge A-C transformer, here being lowered into test area, will undergo tortures calculated to destroy imperfect units.

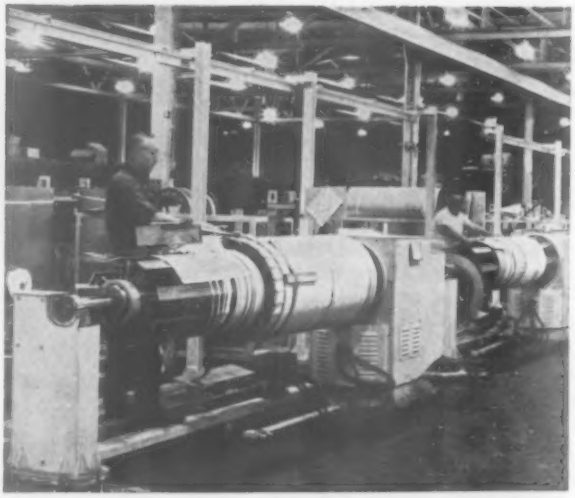
Turn the page

Rolling dollies ease production

Individual dollies for each low-voltage switchgear assembly form a versatile production line. This arrangement makes it easy for Allis-Chalmers to pull any unit out of the line when it is held up or has to be expedited. This installation is an interesting example of successful custom production on an assembly-line basis.

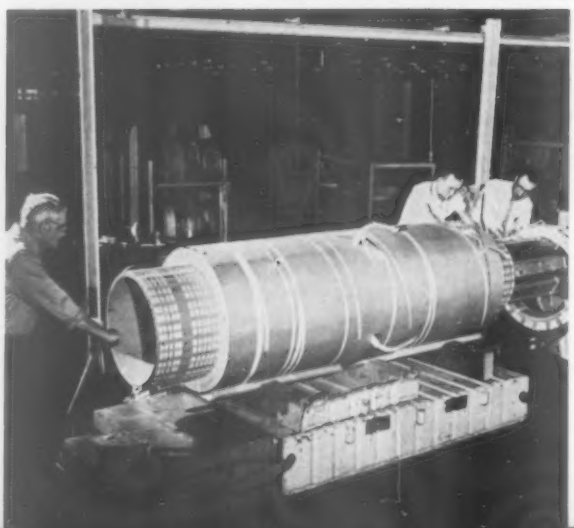
Expanding mandrels slash set-up time

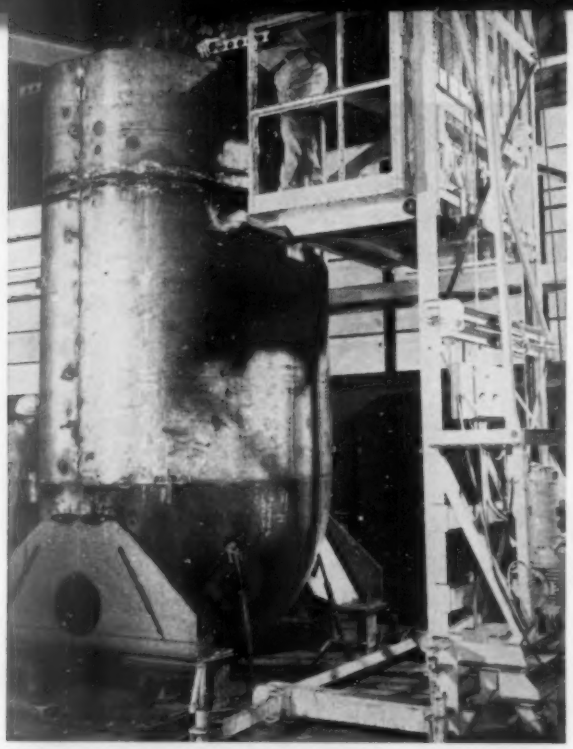
Expansion mandrels on these hydraulically driven winding machines slash set-up time, and can turn out coils with any inside diameter from 8 to 40 inches. The operator can vary rotation speed of his machines from 3 to 45 rpm. Resistance welding equipment at each machine permits operators to butt-weld the wires between reels.



Swinging coils ease unloading

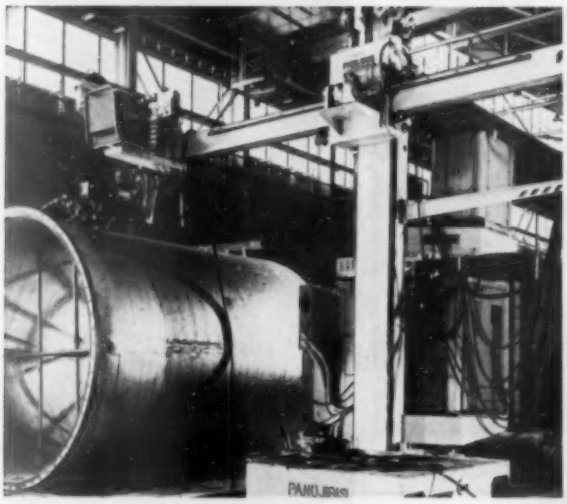
Headstock of each winding machine operates hydraulically to permit swinging the completed transformer coils out into the aisle for easy unloading from the mandrels. Coils weigh 7000 pounds each. Portable racks for vertically mounted reels of wire and insulation (left background) are pushed to appropriate storage area for reloading.





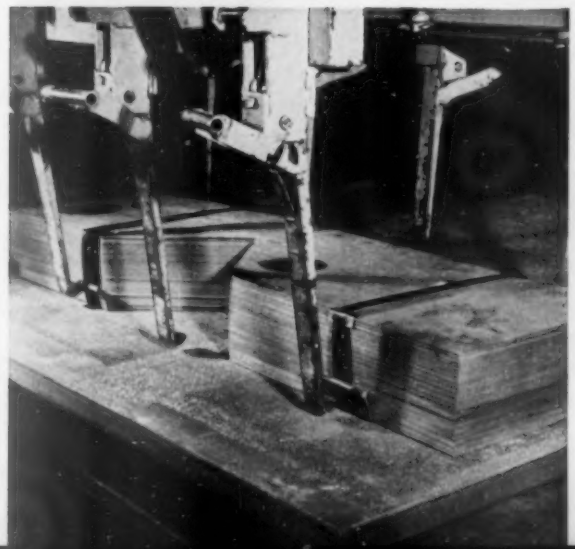
Hi-riding hoist sharpens safety

Platform hoist and mobile scaffold permit working in safety at elevated jobs. Save big time, too. This mammoth transformer tank was bent on a 100-ton forming press in a shop that also boasts of a 400-ton straightening press and other heavy equipment facilities. Floor capacities in plant range up to 6000 pounds per square foot.



Flying boom speeds welding

Just like a TV cameraman at a spectacular, this welder rides to work on a swinging boom. From his cockpit on the positioning arm of this semi-automatic, submerged arc welding machine, our man can easily keep track of the work piece and his instrument control panel. The machine can handle either straight or circular welding jobs.



Lifting bars improve handling

Specially developed by Allis-Chalmers, this handling rig manipulates bundles of transformer core plates. Transformer's entire operation depends upon exact internal conformation, so not even slight scars or dents in plates can be tolerated. Rig has drastically cut scrap and waste while speeding the movement and manipulation.

Breezing through the plant

in an airveyor, metal bases for light bulbs start their journey (top photo below) as a worker rotates the split hopper to feed them into the tube on the floor. From storage, they're fed to a threading machine (bottom). Then they are air-blown again to the next station.

THEY FLY THROUGH THE AIR

with the greatest of savings

Like a gargantuan pea-shooter, the ridiculously inexpensive handling system you see at the left blows parts from station to station, saving time, indirect labor, and equipment costs.

Zipping along at 70 mph., delicate small parts wind through Westinghouse Electric Corporation's Belleville, N.J., plant in a highly efficient, home-grown handling system. Using airveyors (long considered a specialized system for bulk materials), Westinghouse blows thin-walled light bulb bases over 200 feet in two seconds with a mere puff of air. The system needs only a 5-in. water column of pressure—about the same as city gas pressure for home cooking.

The need for a new concept in handling became apparent to Westinghouse when its super-high production (millions of units a day) began to outgrow the old building at Belleville.

Floor-loading limitations kept heavy drawing presses on the ground floor. And the only available space for storage and threading operations was on the upper stories.

Turn the page

Consider the near-impossible task of loading millions of parts into barrels, taking them to elevators by fork truck, unloading them, sending them upstairs, picking them up again, and then hauling them off to storage.

Clearly, Westinghouse needed a system that would handle rapidly a high volume of ultra-lightweight parts; one that wouldn't require extensive structural changes in the building; one that could handle with a soft touch, since the aluminum and brass bases easily eggshelled (bent out of round).

A do-it-yourself project . . .

George Stryker, material-handling specialist for the Lamp Division, came up with the idea of a low-pressure airveyor. But he ran into difficulties trying to buy such a set-up. Six of the seven suppliers he talked with wouldn't even make estimates on anything but a high-pressure system. The seventh sold him motors and venturi tubes on a no-guarantee basis. From then on it was a home-grown project.

Six-inch pipe of low-cost PVC (polyvinyl chloride) turned out to be the best material to attach to the blowers. Initially, Westinghouse bought a double supply of the pipe, feeling that it would be cheaper to replace than to clean. But after two years of operation, not a single length of pipe has had to be discarded.

Motor sizes needed to blow the parts depend on the length of the run. The longest—130 feet across the plant and 70 feet vertically—is supplied by a 1½-hp. blower. But, like the others, this unit has a damper that cuts effective power in half. Westinghouse says it can open up the dampers and blow the parts twice the present distance, even on the runs powered by a ½-hp. blower.

When aluminum light-bulb bases come from the presses, they are covered with a tacky lubricant, but even this doesn't slow down the airveyor. Parts shoot directly into a washer without a sign of clogging. In fact, there has never been a case of clogging in the system, except when an operator has dumped parts into a hopper without first turning on the blower. And even this isn't much trouble to correct—the operator simply pulls off the bottom elbow to clean out a tube.

Although the Westinghouse system is a permanent set-up, the airveyor offers unusual flexibility. Pipe joints are not sealed, but are simply pushed together, allowing new lines to be laced through the plant almost as easily as garden hose.

. . . topped off with a coolie-hat cushion

In its initial stages, the biggest design problem in the system came at the exit end of the 200-ft. run, where the parts shot out too fast, scratching and eggshelling as they hit. Even bleeding off the air toward the tube's exit end didn't solve the problem.

But a "coolie hat" did the trick. This is the name company house engineers gave to the broad-based, unbacked rubber pyramid they stuck under the exit tube. The resilient rubber soaks up kinetic energy as the bases bounce off the sloping sides into the bin.

With this sticky problem out of the way, Westinghouse cranked up the system and started pouring several million units a day into it. And it's been running ever since—maintenance-free, inexpensive, flexible, fantastically efficient.

REVOLUTION on the roof

Armed with new spray-on gun, roofers speed the job, reduce costs, cut dead weight, improve quality.

A three-man team—two men on the roof, one on the ground—can now roof a plant twice as fast as a five-man team using conventional methods. Reason: an entirely new roofing method just unveiled by Flintkote Company (New York). The system makes use of a remarkable three-nozzle roofing gun. The center nozzle sprays chopped glass-fiber roving, which is automatically chopped from a spool of fiber carried on the operator's back. The outside nozzles spray a specially tailored asphaltic roofing compound, which is pumped to the gun through hoses from the ground. No conventional roll fabric is needed. The three sprays produce a strong, monolithic covering.

Cost of the new-type roof, according to the company, is about 24% less than a conventional roof. In-place cost is approximately $8.75 per square foot as opposed to $11.50 per square foot for conventional roofing.

Applications of the new method promise to solve many problems in plant construction and maintenance. Curved roof decks, for example, can be covered as easily as flat roofs with the new method. Similar materials might prove effective as lining agents in tanks, storage ponds, and ditches; possibly answer corrosion and rust problems on exposed plant metalwork such as cooling towers, stacks, flues, and miscellaneous equipment supports.

9 Tips on low-cost buildings

1. Take enough time to plan the site properly
2. Select the most economical building shape
3. Build easy expandability into the new plant
4. Convey your needs clearly—and on paper
5. Analyze repetitive construction details
6. Pick the right services for your operation
7. Limit bidding to prequalified contractors
8. Maintain close, continuous project control
9. Have confidence in your engineer/architect

This year, expenditures for industrial buildings are expected to top $2.7-billion, a 17% increase over last year. Knowing that our readers will be spending a sizable chunk of these billions, FACTORY *sought the advice of a professional engineer on how to get the most out of new-plant dollars.*

The man we called on is Louis Warner (above, center). Lou is a consulting engineer, a past president of the Connecticut Society of Professional Engineers, owner and project manager of the Warner Engineering Company. He's a full-time professional builder, well-equipped to offer straightforward, practical advice on the subject.

Don't expect a checklist of everything you should know about putting up an industrial building. Here, Lou is offering a series of tips. Some of them seem obvious, but plenty of people overlook the obvious when they get buried in the detail of building a new plant.

1. Take enough time to plan site properly

The planning stage is the place to make sure you're getting everything you want from those hard-won new-plant dollars. Compare ideas for layouts. Get them from people who'll be using the new facility. They're keenly aware of problems that may never reach your level, may have plant layout ideas that will simplify them.

Visit other plants. Some of your building difficulties may have already been solved by someone else, so look around. Ask people what they'd do differently if rebuilding, and you'll learn of pitfalls to avoid. Don't forget to ask about seepage problems and to look at the foundation records of older buildings in the area.

After deciding exactly what you want, get it on paper—in detail, so everybody concerned knows what the structure will look like. Consider the multiplicity of choice that faces a contractor who doesn't have detailed plans to work from: materials and methods, column arrangements, bay sizes, ceiling heights, etc. Contractors are reluctant to invest money in providing free engineering along with their construction. They prefer to have a professional do the designing and engineering for them. Remember: the more accurate the plans, the lower the bids.

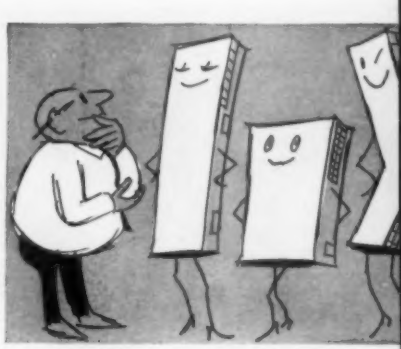
Planning costs next to nothing, yet can save thousands, help you avoid pitfalls. Too often, construction projects are entered into with rough pencil sketches (or none at all), followed by confused hand-waving and a questionable understanding between owner and contractor.

2. Select most economical building shape

In addition to the length-to-width ratio, be sure to check your wall-to-floor factor. This will show how much of your total budget is going into wall costs. As an extreme example, consider an outdoor telephone booth. It has 11.2 square feet of walls for each square foot of floor. On a 60x60x15-ft. building, however, the wall and floor areas are equal—the wall-to-floor factor has dropped to one. But on a 200x200x15-ft. building, it drops further to 0.3. Moral: Experimentation with questionable or unique wall methods in large buildings is not justified unless considerable savings can be assured to make the gamble worth while.

One of the old adages in construction says, "the more corners a building has, the more it will cost." Sometimes a very simple building needs a few setbacks or corners to enhance its beauty. But, used without discretion, they will not only add to the cost, but detract from the appearance, giving a look of Topsy, who "juss growed."

Consider what goes on inside the building, too. By diagraming personnel, materials, and work-in-progress handling you can eliminate rat-maze transportation systems before they get started. A detailed flow layout is the key to a just-right plant shape.

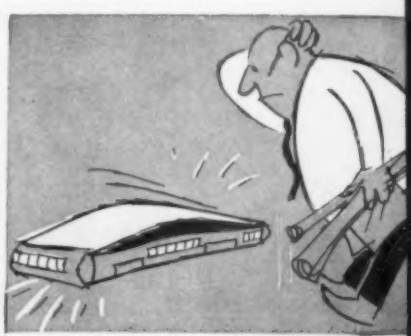


As the length-to-width ratio goes up, so do the wall costs—and on a logarithmic curve. A reasonable shape has one wall 2½ times the length of the other. This costs only 10% more than the cheapest shape—a square. Obviously, wall costs skyrocket for elongated buildings.

3. Build easy expandability into new plant

Consider the rabbit whose home is always too small once it's finished. This is also the problem of most industry. By the time the board of directors agrees on the location and type of building, the finance people arrange the money, the engineers complete the design, and the contractors put up the building, the plant that started five years ago has become too small. That's why, in an industrial construction, future expansion *must* be planned for. Here are some important points:

- Provide areas at the perimeter wall that can be opened up into new structures without shoring the roof or walls.
- Provide sufficient strength in the columns and beams framing the outside walls to carry additional bays on any side that may be expanded.
- Build details into any wall designed for expansion.
- Allow adequate clearances for new materials and new construction; you may want to detail the expansion connections at this point.
- Provide adequate services and principal distribution trunks for water, steam, electricity, and gas.
- Cap the trunks at the perimeter of the expansion area, leave some empty conduits, use extra-large bus-duct feeds.



To avoid being stuck with a brand-new, inadequate plant, you *have* to provide for ready expandability. And you have to build big. Don't add doghouses that will be in the way of real growth. We have yet to hear of a plant with more space planned for than could be used.

Turn the page

Clarify "who does what for whom" in every subcontract and your costs will go down. Estimating material depends largely on the detail in the drawings.

4. Convey your needs clearly—and on paper

Clarity in detail of the "required work list" is an important cost factor. Each heading of the specification should define the areas of work unless completely detailed on the plans. Subcontractors' work overlaps in many cases such as:

- Digging for mechanical and electrical piping.
- Electrical wiring for heating and ventilating equipment.
- Starters and controls for heating and ventilating.
- Supports for piping and mechanical equipment.
- Roof flashings, curbs for fans, pipes, etc.
- Wall insulation, duct insulation, roof insulation.
- Ductwork by sheet metal or mechanical contractor.

In all details where overlapping trades exist, it is well to "call out" on the drawings the various operations done by each and every subcontractor involved, specifically stating "who does what." In the event of a conflict of trades, it will only be necessary to debit one contractor and credit another. This will remove the double cost of two subcontractors figuring on the same work in their bids. Or, worse yet, the cost of neither one figuring or performing the work at all.

It pays to fight for small economies on construction details that will be repeated thousands of times. Consider this: Two buildings constructed with the same basic materials will show a 25% to 30% difference in cost, just on the basis of attention paid to small details.

5. Analyze repetitive construction details

Where great repetition of detail exists, considerable planning, replanning, then replanning again is necessary to obtain the ultimate in low cost and the best utility. Where one detail can cover a thousand lineal feet of wall and be utilized over and over again, bay after bay, it behooves the designer to make critical economic studies.

One place where good detail can be a money-saver is in window design. In most modern construction, continuous fenestration is used to reduce the cost of sash installation. These continuous windows do not have to be simultaneously operated, but can be if desired. The basic difference between this and spaced sash construction is that the latter is generally used in a wall-bearing building, while the continuous fenestration must be used only in a skeleton-frame building. Most industrial construction today uses a structural frame.

It's obvious that spaced sash requires many corners of construction and also increases the number of openings where weather can seep in—both wind and water. Also, continuous fenestration lends itself to hot dipped galvanized windows that eliminate the problem of painting forever (although the cost is 30% higher).

Choice of plant services is an integral part of any new construction. The difference in fuel oil prices (12¢, 9.6¢, and 6.5¢ per gallon for Nos. 2, 4, and 6 oil, respectively) may make it profitable to put in more expensive combustion equipment. It depends on your operation.

6. Pick right services for your operation

Fluorescent light is used almost exclusively in industry today, but many people feel they are paying a premium for it. This is not the case, however. On a yearly basis, depending on the hour usage, the cost of fluorescent fixtures, tubes, and maintenance is approximately two-thirds of incandescents—to say nothing of the increased quality. Therefore, don't consider incandescent fixtures except in places where low temperatures, rough service, or some other reason dictates the choice.

Fuel oil is another plant service that needs careful consideration when putting up a new building. The initial cost of a No. 2 oil system is very low compared to a No. 4 or No. 6 system. However, the cost per gallon drops off rapidly for the heavier oils. And for all practical purposes, the Btu. per gallon can be considered the same for all three.

No. 6 oil requires heat to keep the fuel fluid and some special firing equipment. Generally, No. 4 oil does not need heating, but the storage tank should be sufficient to hold a full tank truck- or tank carload of the oil for the best purchasing economics. No. 2 oil should only be considered for the smaller plants where the initial cost is very important, or where supplies of Nos. 4 or 6 are not readily available.

7. Limit bidding to prequalified contractors

Competitive bids assume an equality of bidders that seldom exists. By prequalification, greater competition and interest are created in bidders. To keep from comparing price tags on different quality merchandise, select bidders on the basis of their experience on similar buildings, reputation for cooperation and reasonable extras, economic and credit standing, present or expected work load, and your own past experience with them. Prequalification assures each of the reputable organizations that it will not be bidding against fly-by-night or unscrupulous people. It will thus make a more zealous effort to be the low bidder.

Bids from three to five qualified firms are usually sufficient to get a representative price. Having prequalified the bidders, it is then possible to award the bid immediately and proceed with construction.

This practice is becoming more prevalent even in public works where it has always been thought necessary to accept the lowest bidder. After bids have been taken, many public committees or agencies are reluctant to reject a bidder because of possible litigation. Through sad experience, however, many owners have learned that the "cheapest" bid is not always the least expensive in the long run.

Placing bids side by side only permits a comparison of price, the stenographer's typing, and the letterhead style. One may be from a firm equipped with the men, machines, and experience to do a good job. Another may be from a shoestring outfit grasping at straws to keep going.

8. Maintain close, continuous project control

Changes are the essence of confusion, ambiguity, and additional cost. They should only be made after itemized cost estimates have been approved and written change orders executed. Consider the secondary effects of these changes. Sketch them out to learn the effects before going too far with estimates. Pencil errors are simple to correct, but when a jack hammer or cutting torch appears on the job, expenses may spiral.

Supervision of construction includes checking shop drawings, processing requests for additional information and certificates for payment. These should not be given a back seat to other new design work in the office. They are just as important to the satisfactory conclusion of the job as the original drawings.

Certifications should be processed rapidly and payments made promptly so that "prebilling" is unnecessary. And the contractor should not have to get additional loans to keep the job moving, thus adding interest charges to his overhead.

Continuity of personnel by the contractor and owner is advantageous to both parties. Many incidental matters discussed in the early stages of a job are almost impossible to pass on to another superintendent.

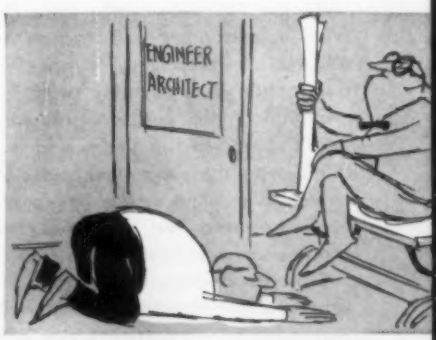
A contractor may have his payments delayed a month or two by the engineer, delayed again in the owner's offices. Thus he feels justified in prebilling. If he must defer payment to subcontractors, they may dilute their efforts on the job. So keep the payments current.

9. Put confidence in your engineer/architect

This man's primary interest is to safeguard the owner and assure him of receiving the best possible solutions to his problem. Your construction adviser does not profit nor should he lose by his decisions.

Don't require the impossible of your engineer/architect. He's only a skilled professional, not a mind reader or a magician. Give him your full cooperation. Allow adequate time for conferences without interruption. Give him freedom to take the necessary field trips to see similar construction. Follow the project through with him so you are both thoroughly conversant with each other's requirements at all times, as well as with the details of the job.

Remember, too: He's the man who must act as an impartial judge in disputes between owner and contractor and must make equitable decisions based on contract documents. Realize that there will be some problems caused by deficiency in the planning. A few such errors are inherent in any creative work involving dozens of contractors, hundreds of materials, and thousands of individual pieces. But if you've given your engineer/architect the cooperation and authority he deserves, you'll find that he can help you weather all but the most disastrous storms.



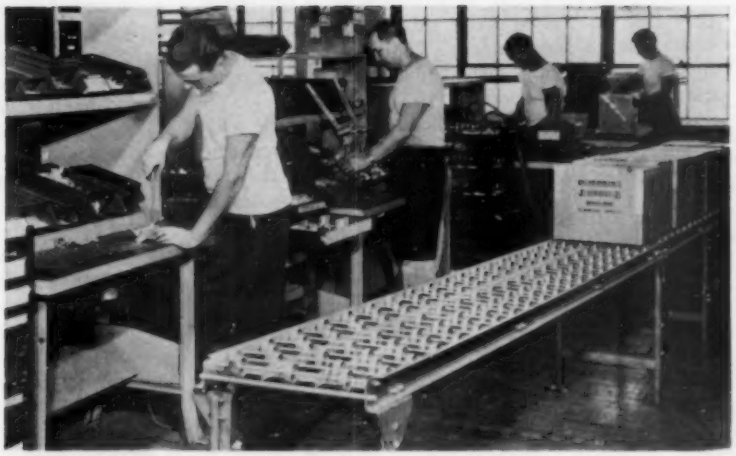
After you hire a construction adviser, you must place considerable trust and faith in his judgment. He shouldn't be looked upon as a contractor or ever placed in the position of one. This guy can literally be worth his weight in gold, so you should treat him accordingly.

This is the managerial team that produced such spectacular gains on a small, 50-man production facility at the I-T-E Circuit Breaker Company, Philadelphia. Above, the assembly area plan is studied by **(left to right) H. F. Baker, assistant superintendent, breaker assembly; C. E. Petit, superintendent, breaker production; R. W. Reuther, administrative assistant; J. R. Chamberlin, Jr., manager, circuit breaker section.** By coordinating the re-design of its complex circuit breakers with a carefully planned assembly technique, I-T-E made these gains: doubled production and built-in quality control with only half the personnel, in half the time, and in less than half the space formerly required.

The key to these savings is an automotive-type subassembly construction that has allowed a surprising degree of semi-automation of a complex product.

Planning this simpler production technique took two full years and was dovetailed with the subassembly design of the new breaker line. After seven plans had been prepared and discarded, the eighth proposal was adopted and built.

Periodic re-designing of the product is standard practice in most manufacturing industries, as is a cost-reduction program in the production cycle. But all too few plants realize the potential value of integrating these efforts. Fewer still have combined their programs to produce such spectacular gains as the ones made at I-T-E.



SUBASSEMBLY WORK begins with moving contact mechanisms, built up at the first two benches **(above)** and assembled onto upper moldings at next bench. Breaker mechanisms are built **(left)**, then placed on overhead monorail by last assembler. Stockman removes parts from bulk to replace working stock in front of assemblers.

Half the SPACE
Half the PEOPLE
Half the TIME...

These are the dramatic savings one forward-thinking management team (opposite page) made when it transformed a 50-man job shop into a smooth-working assembly line at I-T-E Circuit Breaker Company.

Formerly, I-T-E's K-line of breakers—60-volt units in 225-, 600-, and 1600-amp. sizes—were almost custom built, because of the many options and special features available. This meant it took a long time to write up an order for exactly what a customer wanted . . . and a correspondingly long time to build the breaker.

The new, speedier system took two years to develop. And they were years crammed with ideas and decisions. Before they had just the right combination, the I-T-E development team conceived—and threw away—seven different plans. The one they chose integrates a new breaker design—one based on component assemblies rather than complete units built singly—and a planned-flow assembly line.

By building components rather than full assemblies, I-T-E can start to fill orders right on the final assembly line. Before, it was necessary to start from the ground up—which meant almost custom fabrication.

From the more than 1000 separate parts that can be assembled into more than a million combinations of finished breakers, I-T-E now builds 50 subassemblies. The major portion of breaker production time is spent in the subassembly stage, rather than in final assembly as it was in the previous set-up. As a result, a great deal of flexibility is inherent in the new facility because of the ability to switch assemblers back and forth between production stages as needed.

If orders decrease from the average, for instance, workers can be

shifted from final back to subassembly. Conversely, they can be shifted from subassembly to final, if orders surge momentarily. This acts to cut the inventory of semi-finished material and increase output of finished goods.

Such a system results in flexibility to handle wide fluctuations in orders, a more even work force, and greater over-all department stability. Fast delivery can be maintained despite appreciable increases in incoming orders.

Recently, for instance, a temporary 60% increase in orders was accommodated by the addition of only one extra subassembler. Shifting other personnel from sub- to final assembly enabled I-T-E to fulfill the increased demand easily.

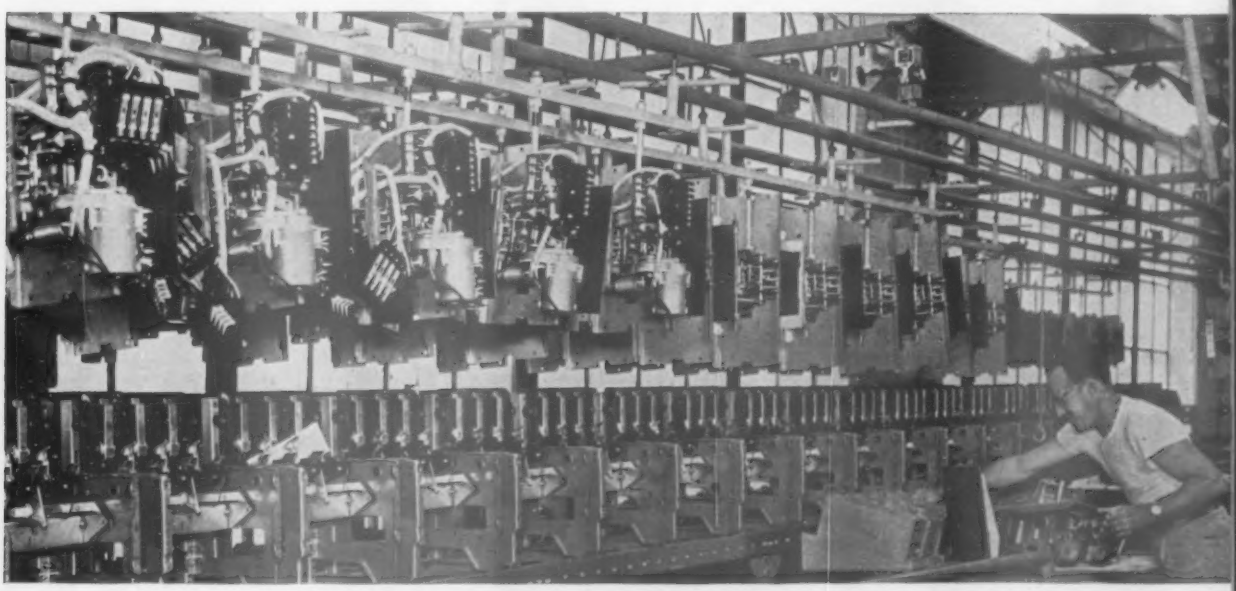
And there's another way the subassembly system saves time. A new catalog numbering system, originated with the new designs, designates and provides complete information on almost every possible breaker. This permits the field sales engineer to write an actual shop order on the spot with a number specifying the exact breaker—immediately cutting off four major time-consuming steps before production.

A planned material flow eliminated miles of back-and-forth traffic. The new set-up provides maximum efficiency, minimum of movement. And it eliminates conflict between stock handlers and assemblers through separate working aisles for stockmen.

When the K-line planners changed the stock control set-up, they used a most fundamental approach —the unit system. Not at all new or unique, the concept was lifted directly from the old two-barrel grocery store system. That is, when one barrel is empty, you sell from the second and order a third.

Separate bulk and working stocks were established. Working stock boxes, from which assemblers pull parts, are so marked and are placed in the most convenient spot. On the previous line, assemblers worked exclusively from bulk stock—a hit-or-miss proposition where stock control was concerned.

. . . From fifty subassemblies, I-T-E can fabricate more



WIRING takes place after mechanical assembly at I-T-E. This is one of two identical benches that can be manned according to production requirements. Basic breakers pass by on conveyor table, mechanisms travel on overhead monorail system.

TESTING encompasses a final check of electrical features, including motors on electrically operated models, and such features as shunt trips on manually operated units. Breakers come by on a roller table.

In the working stock there are two units, each consisting of an amount sufficient for half-a-week's work. When the assembler empties one box, the stockman replaces it within two days.

Record cards were established for deductions of parts. The stockman marks on these cards each unit removed from bulk to working stock and counts the unit boxes remaining in bulk stock. Shortages are easily spotted without even consulting the cards.

The subassembly approach was chosen as much for product reliability advantages as manufacturing efficiency. Component construction, for instance, greatly simplifies maintenance, service, and replacement of breakers and parts in the field.

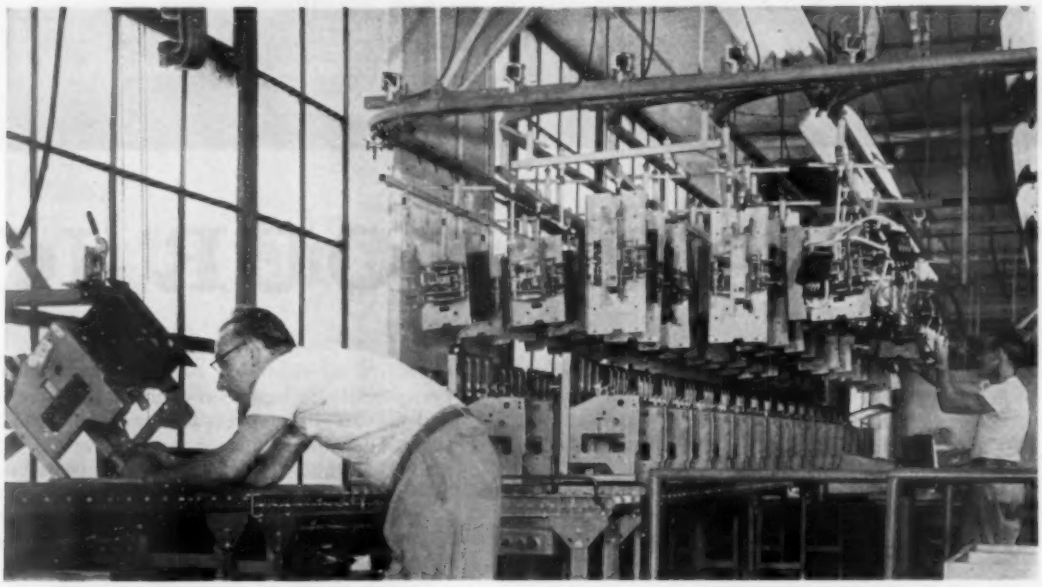
On the assembly line, breaker reliability has been increased by holding subassemblies on overhead transfer conveyors. This virtually eliminates storage and manual handling. By drastic reductions in handling, I-T-E cut its re-work time by over 80%.

Extensive use of fixtures has also contributed to product quality. Unworkable under the old system, the fixtures are now used on each subassembly. They eliminated the problem of cumulative tolerances, which, in turn, has eliminated some inspection steps.

All along the line, methods have been keyed to the new design. In the previous system, each worker handled all parts and assemblies; now a man builds only a portion of the complete breaker or does final assembly. In either case, all the parts he requires are immediately available to him. Result: Production can be increased 300% by adding three more men.

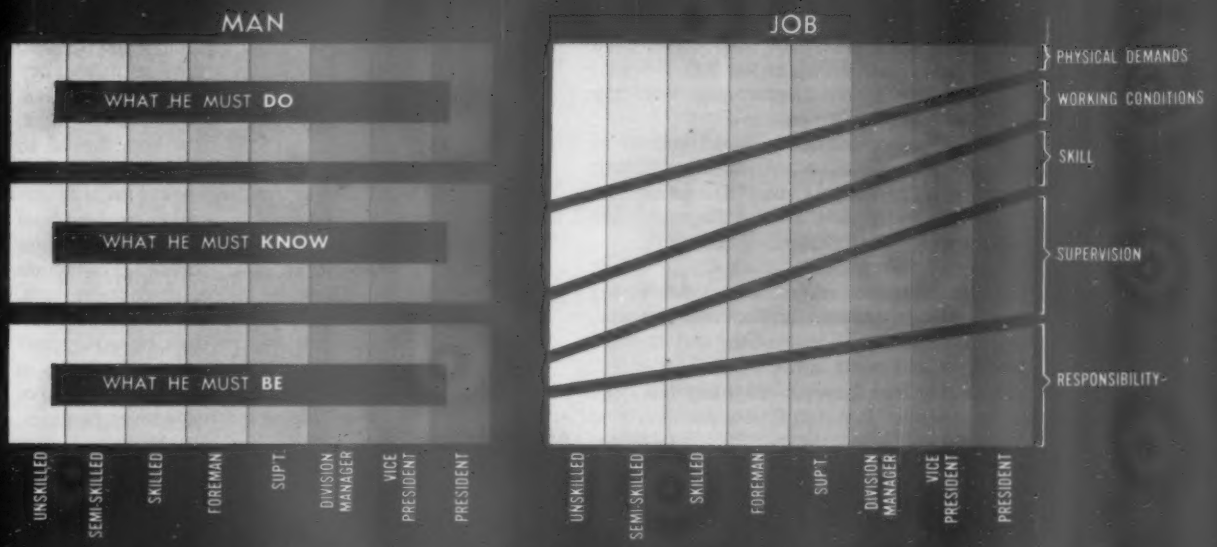
Is there one key factor in such an effective combination of cost-control and product improvement? The planners of the new K-line say there is: It lies in those seven plans that were thrown away. They got rid of the unrealistic ideas, the inadequate facilities, and methods that weren't flexible. Moreover, they retained the best ideas and integrated them into a smart, smooth assembly operation. At I-T-E, success can be summed up in a word: planning.

than a million combinations of finished breakers



FINAL ASSEMBLY takes place at end of monorail and conveyor system where frames and mechanisms have just been combined. Here, assembler selects mechanism and drawout bars, assembles, adjusts, and adds overloads.

PACKAGING for shipment is the final step in the production of K-line breakers. Packer uses an overhead crane to pick breaker off the roller table and lower it into a heavy carton, marked and ready for shipment.



THE CHARTS ABOVE show the two main variables in any job. The MAN in the job is never an exact fit for the mold. Every man is different in his performance, his knowledge, and his personality. The JOB changes as it broadens in scope from the simple to the complex. For example, the physical demands on the president are less than on the janitor. The pressure of responsibility is highest for the top men. THE CHART AT RIGHT is an exploded version of the smaller "job" chart above. It dissects five job elements for eight job levels, from unskilled to president.

YOU AND YOUR JOB—

How important are you? How important is your job? If you're like most managers (or anybody else, for that matter), these questions are vital ones. Yet the answers are hidden in a cloud of confusion, emotion, and fuzzy thinking.

MANAGER'S CHARACTER

If the cloud is blown from the problem of evaluating the management man, we can assume that his success depends on what he knows, does and is (chart above, left). The higher the management level, the greater the demand on what a man is—on his personality, interest in others, attitudes, and leadership potential. So one way to evaluate your place in the organization—and your ultimate potential as manager—is by a frank appraisal of your character—of yourself as a person.

An example comes from two similar operating units of a large chemical plant. The managers who headed the units had similar technical backgrounds and work histories. All usual measurements showed that both units produced with similar efficiency.

One of the managers was open-minded, creative, personable. He was soon promoted to a better job, and his well-trained, capable staff hardly missed a step. The other manager was introverted, opinionated, autocratic. He was eventually (wisely) moved over to a staff job at company headquarters. When he left his operation, efficiency fell off sharply because the staff had not been trained. They couldn't make the decisions needed to run the plant.

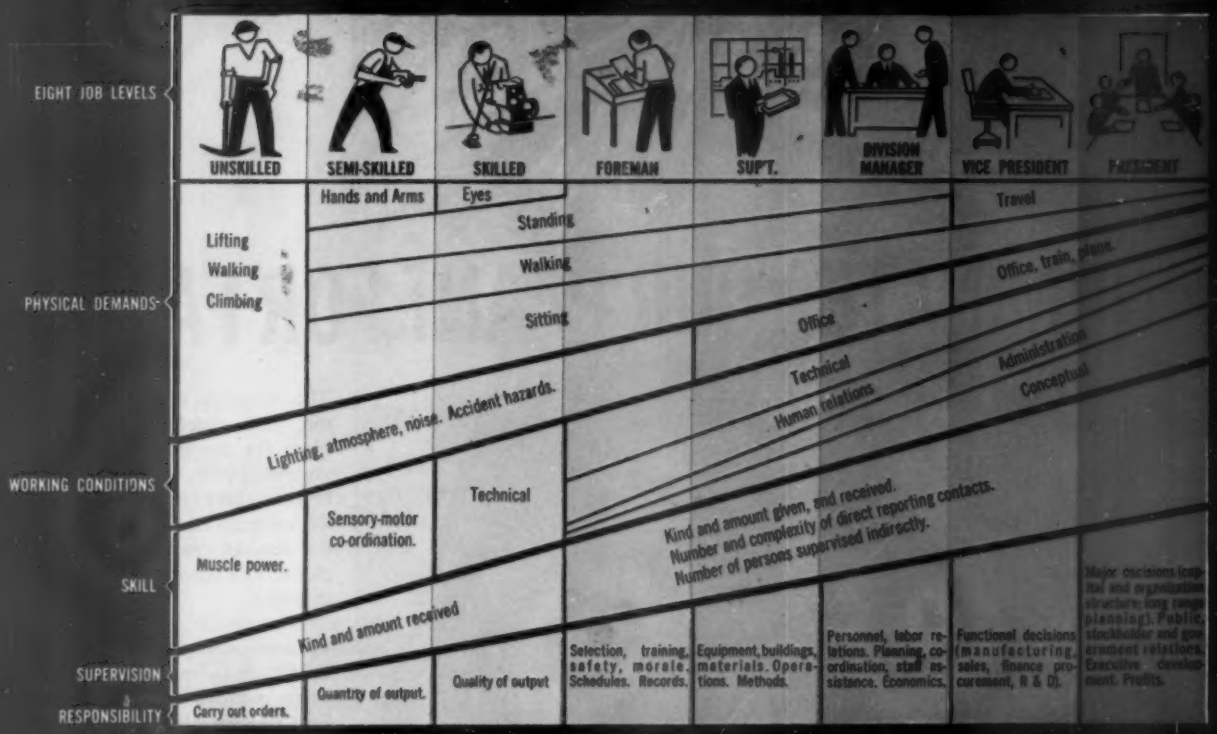
From management's viewpoint, this example demonstrates the importance of what a man is, as distinct from what he knows and does in meeting current job objectives. Of course, this doesn't imply that either knowledge or performance are unimportant. Only that character becomes more important with greater responsibility.

MANAGEMENT JOB ELEMENTS

Blowing the cloud of confusion from management job evaluation begins with a basic decision. There are two approaches an organization can take:

(1) Jobs can be evaluated with a separate set of factors for each group of jobs. If this system is used (and in some cases it is the best choice), a single

By EUGENE J. BENGE, Consultant, Asheville, N. C.



a pattern of change

plant can often wind up with literally dozens of separate job evaluation systems in effect at once. This article doesn't deal with that kind of job evaluation method.

(2) Jobs can be evaluated according to one set of generic factors for all job groups. If this choice is made, it becomes necessary to redefine the job factors to meet the conditions of each group. Failure to recognize this simple principle is the reason companies experience so much trouble in extending job evaluation systems upward.

The concept of "skill" used in so many systems provides a readily understandable example. What is the skill of . . .

The company president?	(Level 8)
The vice president?	(" 7)
A division manager?	(" 6)
A superintendent?	(" 5)
A foreman?	(" 4)
A machinist (skilled)?	(" 3)
A punch press operator (semi-skilled)?	(" 2)
A yard laborer (unskilled)?	(" 1)

If the term means only sensory-motor coordination or technical skill, then the high-level jobs will be relatively unskilled. High-level men will get little credit for this factor. But if skill can also mean human relations skill (handling subordinates, meeting customers, dickering with supplier salesmen, interviewing applicants, and the like), we can give adequate "skill credit" to middle-management jobs like those of foreman, salesman, buyer, and employment interviewer.

Above this level, if skill can be interpreted as administrative skill (planning, coordination, control) or conceptual skill (organization, innovation, integration, and others), we open up considerable latitude for crediting the skill of the top executive jobs themselves.

CHANGE AS YOU CLIMB

The large chart above illustrates the changes that occur in five factors frequently used in job evaluation. Admittedly, the diagrams fail to consider every aspect perfectly. For one thing, they are two-dimensional. And many concepts of man and job are multi-dimensional. But the diagrams do aid in dispelling some of the clouds that surround management job evalution. Chances are, you can spot your job somewhere in the large diagram.

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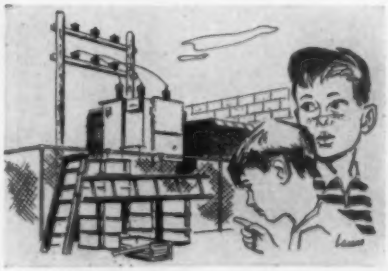

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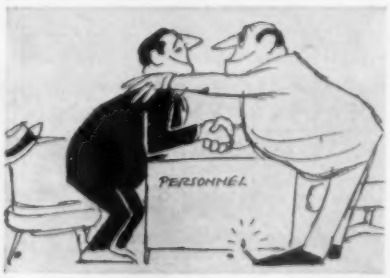


For more about these items, circle numbers on Reader Service Card next to back cover.

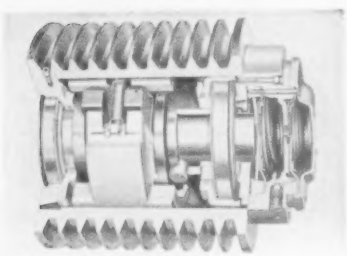
Light or fragile parts move on air cushion

The jetstream, up to now just a transcontinental air current, has been grounded to serve material-handling needs. This "Jetstream" is a conveyor system that moves at speeds to 2000 fpm. on air cushion.

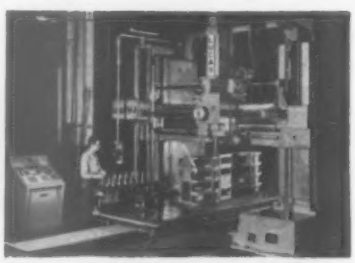
It's done by metering low-pressure air through special louvers. These direct the air flow along the carrying surface of the conveyor (insert). Air belt thus created has level load capacity of up to 30 lb./sq. ft. and can operate at 45-deg. inclines. Gently handles fragile light bulbs and lightweight metal parts, or wood chips, sawdust, and cardboard (photo). No moving parts mean no wear, clean-up costs, or accident hazards. System can be installed around machinery where moving bed conveyor is impractical. *Engineers Associated* (Circle 88).

Hercules of a truck

Said to be largest ever made, this fork truck has 35-ton capacity. Measures 12x29x11 ft., with pneumatic tires 74 in. high. Has rear controls for driving backward. Handles easily with power steering, power transmission, 4-wheel drive. *Clark Equipment Co.* (Circle 89).



90—Power Drive, 3 to 2000 hp., is combination of automatic clutch, adjustable torque selector and variable starting time delay. Good for high starting torque and shock-load applications. Friction materials last for over 30,000 starting cycles. *Olme Precision, Inc.*



91—Vertical Spindle Machine Tool, with numerical controls, automatically drills, bores, mills, and taps large castings to ±0.0002-in. accuracy. Has 42 feed rates, 10 machining sequences. For tools from ¼-in. drills to 14-in. milling cutters. *New Britain Machine Co.*

92—Light Bulb, using no ballast, new wiring, or special socket, screws into mogul-size incandescent socket to double light without increasing wattage. Its 1750 watts delivers nearly 60,000 lumens. Resists weather. *Duro-Test Corp.*

93—"Scan-A-Graph" televises static information on closed-circuit system to as many as 500 receiving stations. Transmits without camera or special lighting. Produces intense, clear image, little distortion. *Television Utilities Corp.*

94—Steel-Armored Hose has outstanding resistance to fire, heat, and mechanical damage. Tested for 15 min. in 2000 F. flame while carrying paint, it showed no sign of flaming. Handles chemicals, flammable liquids. *Samuel Moore & Co.*

95—Fluorescent Danger Flag, in flame red, can't be missed even at distance. Protects work crews, foot and mobile plant traffic. Nylon-base fabric is covered with vinyl. Many styles, sizes. *Albert W. Pendergast Safety Equipment Co.*

Turn the page

In goes Solnus . . . out goes compressor trouble

By using a Sun Solnus oil, this man is eliminating dangerous carbon build-up—the chief enemy of compressors and the cause of most maintenance shutdowns.

Solnus oils have proved to be ideal compressor lubricants. They form very little carbon . . . and what does form is a soft and fluffy kind that blows away easily from valves and exhaust parts. Because carbon does not build up, ring grooves and air lines stay clean.

With freedom from carbon build-up, operators are assured of peak compressor efficiency for months and sometimes years. Maintenance costs go down and stay down. In short, with Sun Solnus oils you get all the special benefits of quality . . . the best economy of all!

For the full story about the extra benefits of Solnus oils, see your Sun man, or write to SUN OIL COMPANY, Philadelphia 3, Pa. Dept. F-8. In Canada: Sun Oil Company Limited, Toronto and Montreal.

SUNOCO

MAKERS OF FAMOUS CUSTOM-BLENDED BLUE SUNOCO GASOLINES

For more facts Circle 421 on Reader Service Card

Two extra arms for overhead work

Could you use an extra "man" just to handle overhead maintenance and installation? This fellow works fast, doesn't tire, never talks back, and won't suffer from agoraphobia. He's an asset to any crew.

This answer to a maintenance manager's dream is simply an aluminum hoist assembly for scaffolds. It can add an extra set of time- and fatigue-saving arms to your one-man maintenance crew.

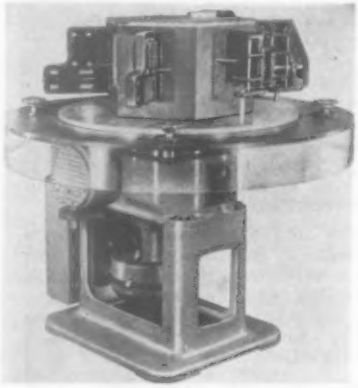
The "mechanical man" attaches to the crossbar of standard scaffolds with 2-in. diameter couplers and wing nuts. T-shaped, with upraised arms, it carries the load upward along the vertical track by manual winch and locks in position. Height can be increased by adding 3-ft. track sections to hoist. Once in position, rollers transport the assembly horizontally along the crossbar to installation position.

Rubber-padded lifting arms have load capacity of 125 lb. Higher loads are possible with special design. Fluorescent fixtures, bus ducts, conduit, pipe and sheet metal work are just a few of the materials this hoist assembly can handle. *Up-Right Scaffolds* (Circle 96).

Now—a machine tool for automatic assembly

This standard machine tool automatically produces up to 120 assemblies per minute. You can re-tool it over and over with a minimum of design time. You only add fixtures needed to grasp assembly components. Makes short runs feasible.

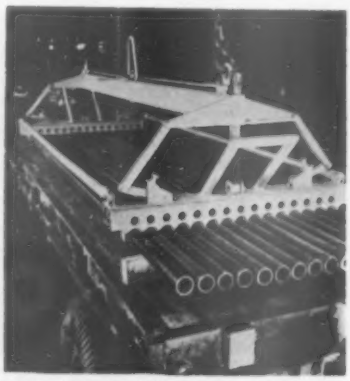
Model (photo) has 12-stop, 36-in.-dia. dial; six work stations service two adjacent work-holding nests. Placing units provide "push and guide" or "pick and place" parts handling. In various dial sizes, work-station combinations. *Ferguson Machine Corp.* (Circle 97).



98—Digital Computer, for general-purpose use, can be programed without skilled operators. Medium-priced, all-transistorized, it can add 25,000 five-digit numbers per sec. Simultaneously handles eight peripheral devices, such as punched-paper tapes. *General Electric Co.*

99—Wagon Truck, 2000-lb. capacity, has 1-in. flange turned up around deck for holding maintenance and repair tools. Said to steer safely and easily due to fifth-wheel assembly design. For millwright or general use. Plastic or rubber tires and handles. *Hamilton Caster & Mfg. Co.*

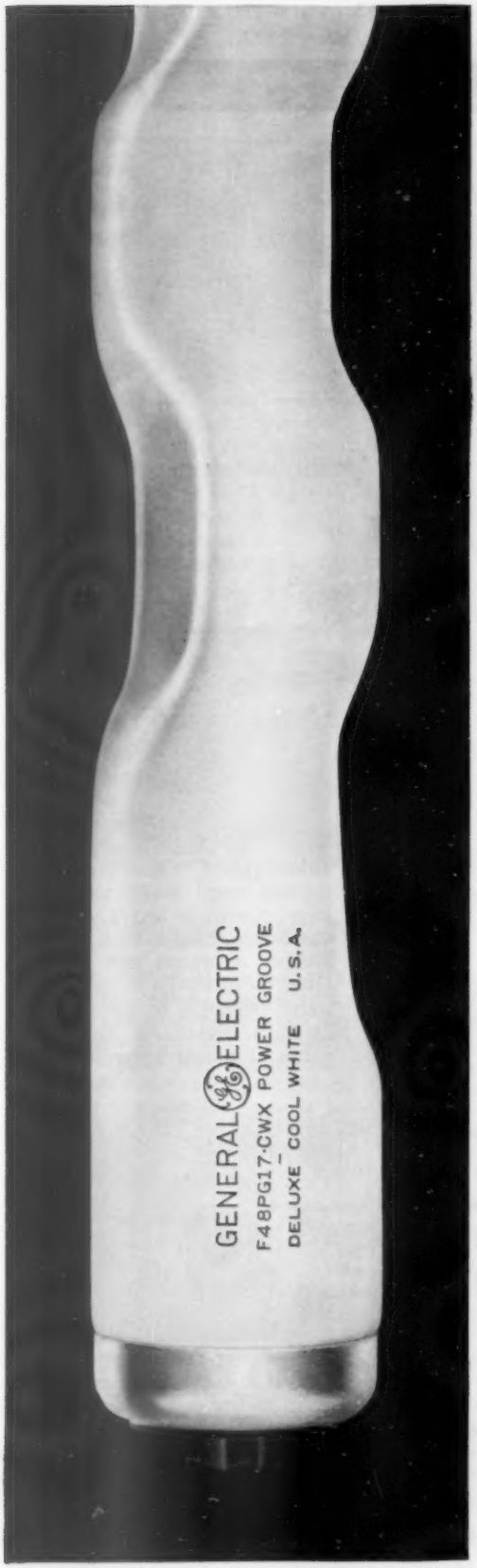
100—Emergency Light Pack has 6-volt nickel-plated cadmium battery which guarantees extra-long life. Charging circuits are monitored by transistor—no switches or dials. Recharges rapidly, maintains full power constantly. Meter shows voltage. *Electro Powerpacs, Inc.*



101—"Protolift" grips up to 15 tube- or pipe-lengths at once to simplify and reduce handling costs. Once positioned over load, circular finger-bars fasten partially around length of pipe and are released at destination. Made to fit any pipe diameter. *Heppenstall Co.*

102—Electronic Metal Signaler spots any type of metal without physical contact. Transistorized, sealed-in weather- and dustproof case. Probe can be immersed in liquids. For counting, broken tool detection, etc. Handles to 100 operations per min. *Automation Devices.*

Turn the page



THE DENTS IN THE TUBE

give you more light with fewer lamps

New General Electric Power Groove* Lamps are certainly the queerest looking fluorescents ever made. But those dents are what make it possible for the G-E Power Groove Lamps to give you nearly *twice as much light* as the next most powerful fluorescent lamp type! And only General Electric can make them. General Electric makes its own glass (as it does *all* lamp components) and this engineering know-how has enabled G. E. to come up with the unique grooved design that lengthens the arc to give you extra light.

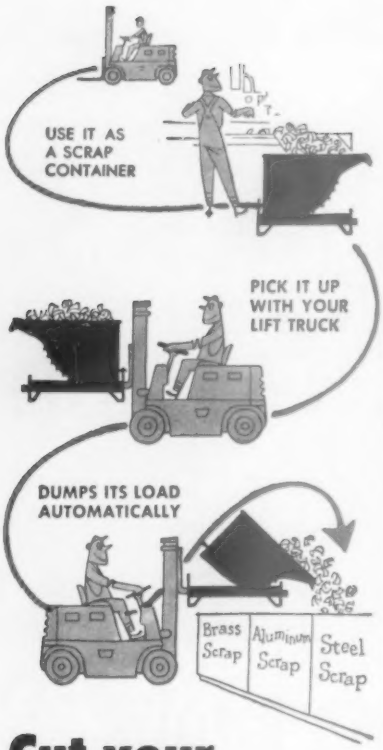
The same General Electric research that created this new years-ahead light source is giving you more and more light for your money in *every* G-E Lamp you buy —from the standard 40-watt G-E fluorescent, the most widely used fluorescent lamp type in the world, to the new smaller, whiter, brighter G-E 100-watt bulb.

Ask your General Electric Lamp distributor to recommend the best type of lamp for your lighting needs. General Electric Company, Large Lamp Dept. C-030, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

*General Electric trademark for its non-circular cross section lamp.



Cut your scrap-handling costs 50%

Handling scrap metal is a simple, one-man operation when you use Roura Self-Dumping Hoppers. Place them in strategic spots for scrap collection. One man with a lift truck carries them to scrap bins or freight car . . . flips the latch and the hopper automatically dumps its load, rights itself, locks itself, and it is ready for another load. Hoppers may be labelled for different kinds of scrap for easy, profitable scrap segregation. No wonder they're cutting costs in hundreds of plants.

Forks or platform of any standard lift truck slip easily into under-frame of a Roura Hopper. Pick-up is swift and simple. Made in 8 sizes from ⅛ to 4 yard capacities and mounted on live or semi-live skids with choice of wheels.

They're made of 3/16" steel plate with continuous arc-welded seams. Heavier plate if desired. Standard models shipped from stock immediately. Also available in stainless steel and galvanized.

ROURA
Self-Dumping
HOPPER

WANT DETAILS?

Clip this coupon . . . attach it to your letterhead . . . sign your name . . . and mail to . . .

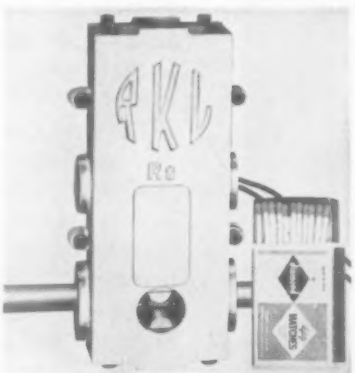
ROURA IRON WORKS, INC.
1423 Woodland Ave., Detroit 11, Michigan

112 Circle 423 on Reader Service Card

For more about these items, circle numbers on Reader Service Card next to back cover.

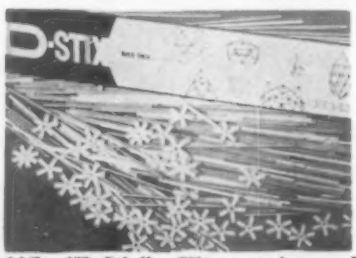
103—Floodlight, with 8-deg. vertical and 100-deg. horizontal beam spread, focuses light where you want it. Avoids light spread of oval or round beams. Two models: 500 watt operates on 120 v., 1500 watt on 277 v. Uses quartz-iodine lamps for long life. *Wide-Lite Corp.*

104—Numerical Tape Control system automatically controls one to five machine-tool movements up to 999.999 in. at ±0.0005-in. accuracy. Also handles all auxiliary machine tool functions. Uses all-static, all-transistorized circuitry. *Westinghouse Electric Corp.*



105—Solenoid Valve, for metering, sampling, or "on-off" control, provides gas-tight shutoff under vacuum or pressure conditions. For use with corrosive fluids, slurries, dry powder. Pinch-type design eliminates seats, disks, or packing glands. *RKL Controls, Inc.*

106—Turret Lathe, numerically controlled, has an electronic memory system that stores up to 96 operational commands of any machining set-up. Uses no tape or other outside programing. Pre-set commands can be changed without disturbing others. *Warner & Swasey Co.*

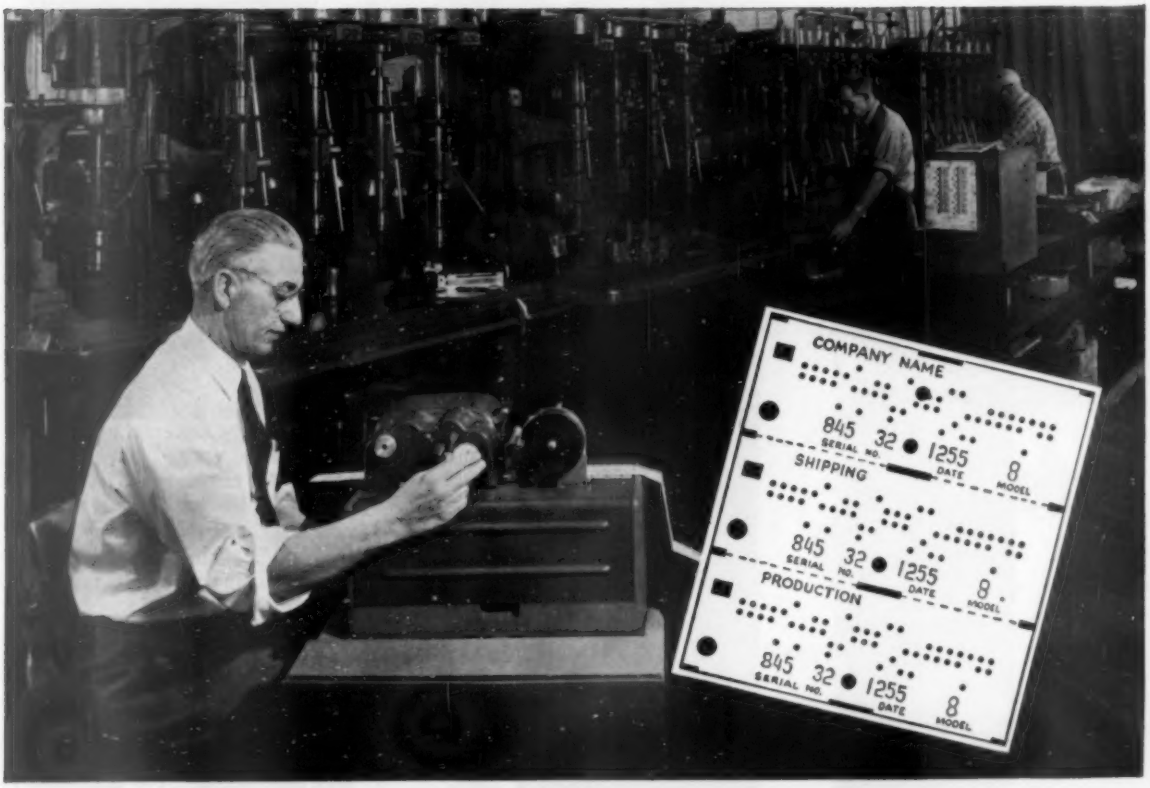


107—"D-Stix" Kit consists of colored wood sticks and rubber joints (Universal and T-joints) that can be combined to form an infinite number of shapes and structures. Good for mock-ups to test function, stress, efficiency, or aesthetic value. In three sizes: 230, 370, or 452 pieces. *Edmund Scientific Co.*

108—Power-Factor Capacitors are housed in individual cases for maximum cooling and isolation of faults, ease of mounting and maintenance. For low-voltage systems, ratings are 240, 480, 600 volts, 60 cycles; high-voltage: 2400, 4160 volts. *Federal Pacific Electric Co.*

Turn the page

DATA PROCESSING THRIVES ON AN ERROR-FREE DIET!


COMPANY NAME
845 SERIAL NO. 32 1255 DATE 8 MODEL
SHIPPING
845 SERIAL NO. 32 1255 DATE 8 MODEL
PRODUCTION
845 SERIAL NO. 32 1255 DATE 8 MODEL

By recording information as it originates,
Dennison Print-Punch checks three common causes of input errors!

Minimizes manual recording! Smudged, illegible, temporary records never have a chance to infiltrate your tabulating room when portable Print-Punch Machines take over. Stationed where data starts, Print-Punch Machines create accurate machine-language records of all operations . . . from Receiving to Shipping and anywhere in between. Information takes only a few seconds to dial. Push a lever and 20, 25 or 31 column tickets come out printed and punched at speeds up to 300 stubs per minute.

Eliminates mutilated source documents! Small, durable Print-Punch Tickets travel along the production line with your product . . . withstanding abuses that damage larger, flimsier input media. Available serially or repetitively numbered in continuous strips of single or multiple stubs, Dennison Print-Punch Tickets can be tailored to fit almost any control or accounting system.

Reduces key punching errors and costs! Print-Punch Tickets are automatically converted to punched cards or punched paper tape without need for key punching. "Batch" machine-language records, created at the source by a single setting of a Print-Punch Machine, can often save hours and hours of key-punching time in the tabulating room. That's why key-punching costs shrink when Dennison Print-Punch goes to work!

Learn more about making your data processing more accurate with Dennison Print-Punch Machines and Tickets. Mail coupon today.

Dennison *Helping you compete more effectively*

Dennison Manufacturing Co., Machine Systems Division, Dept. H-104, Framingham, Massachusetts

Please rush your brochure on the use of Dennison Print-Punch Tickets and Machines for extending automatic data processing efficiency to inventory, reorder, production and inspection systems, payroll and cost accounting.

Name.....Title.....

Company.....

Address.....

City.....Zone....State.....

NEW!

2½-lb. Pressurized Dry Chemical

5-lb. Pressurized Dry Chemical

Kidde dry chemicals kill more fire faster!

Granted top rating by Underwriters' Laboratories, these two new Kidde dry chemical extinguishers pack the *extra* punch you need to knock out stubborn blazes. These 2½- and 5-pound Kidde units put out as much fire as eight and sixteen one-quart carbon tetrachloride portables respectively. They are perfectly balanced for fast action, are light in weight, easy to operate even while wearing gloves. And — no pin to remove, no valves to turn, no inverting or bumping needed. Just aim at fire and press the lever! Pressurized, they can be easily and quickly recharged with air or nitrogen. No pressure cartridge needed. Write for more information on these new Kidde extinguishers — easiest-to-operate of all dry chemical portables.

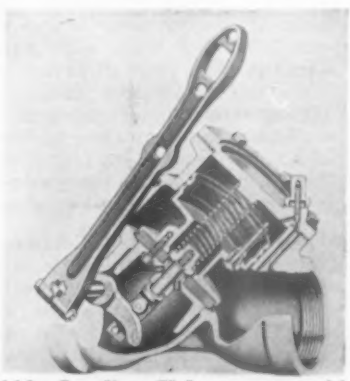
Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc., 832 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

For more about these items, circle item numbers on Reader Service Card next to back cover.

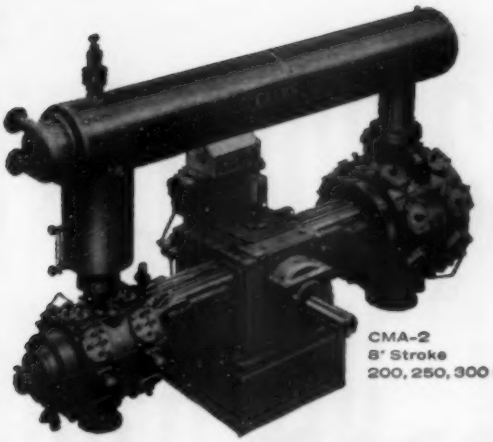
109—Pallet Conveyor uses chains, mounted on frame, to carry pallet along. Air raises or lowers frame to permit right-angle transfer to powered roller conveyors. Any number of conveyors can be used as transfer points. Chain conveyor is reversible. *Standard Conveyor Co.*

110—Portable Cable Tester is electronic ferret that seeks out and pinpoints potential underground cable insulation failures. No need to disconnect cable. Easy to operate, it finds the fault quickly at savings in time and expense. Built-in safety features. *Sorensen & Co.*



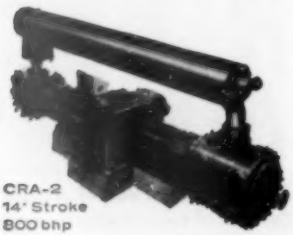
111—Loading Valve comes with disks of neoprene, Compar, silicone, Teflon and Viton-A to handle many liquids. Closes with little shock, without damage to meter, pump, piping, yet holds afterflow to minimum. Easily adjusted to flow changes. Sizes to 4 in. *OPW-Jordan.*

Turn the page

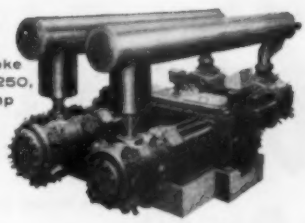


CMA-2
8" Stroke
200, 250, 300 bhp

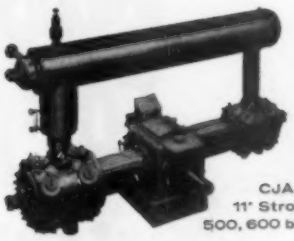
Whatever your requirements for industrial air,



CRA-2
14" Stroke
800 bhp

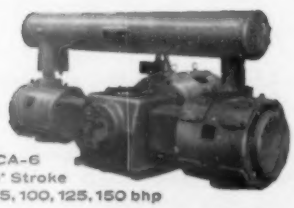


CRA-4
14" Stroke
1000, 1250,
1500 bhp

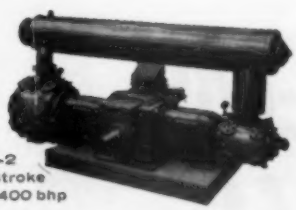


CJA-2
11" Stroke
500, 600 bhp

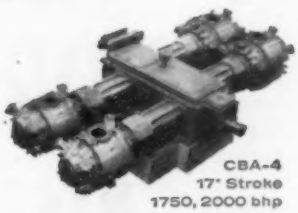
there's a Clark Balanced/Opposed Compressor



ICA-6
6" Stroke
75, 100, 125, 150 bhp



CMB-2
8⅛" Stroke
350, 400 bhp



CBA-4
17" Stroke
1750, 2000 bhp

to do it better & more economically in less space.

Six Stroke Sizes...23 Models. The Balanced/Opposed design is only one of many innovations that have made Clark air compressors the most dependable in industry today. Rugged and compact, they are specifically designed to handle your "100 lb." air requirements most economically. ■ Born of exhaustive research and proved by millions of hours of service, Clark Balanced/Opposed Industrial Air Compressors are engineered for maximum performance and reliability. They come equipped with "Simplaire" Valves—the simplest air compressor valves in the industry . . . easy to put together, easy to take apart, and *easy on your maintenance budget*. From a comprehensive line of 23 models, you can pick the compressor that's *right* for your needs. Sizes from 75 to 2000 horsepower; capacities range upward from 375 cfm. ■ For all the reasons why you'll be dollars ahead with Clark compressors, contact your Clark representative today, or write for Bulletin 185, **Clark Bros. Co., Olean, N.Y.**

CLARK

DI DRESSER INDUSTRIES INC.
OIL • GAS • CHEMICAL
ELECTRONIC • INDUSTRIAL

ENGINES ■ COMPRESSORS ■ GAS TURBINES

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NIBROC®
EACH DAY
KEEPS
PROBLEMS
AWAY!

You've bought the most satisfying paper towel you can put your hands on!

Choose from the complete line of NIBROC Quality towels . . . multi-fold, single fold or C-fold in natural, or the super white embossed line—packed in convenient Zip-Top cartons. Write Dept. FO8, Boston, for samples . . . or look under "Paper Towels" in Yellow Pages for name of nearest distributor.

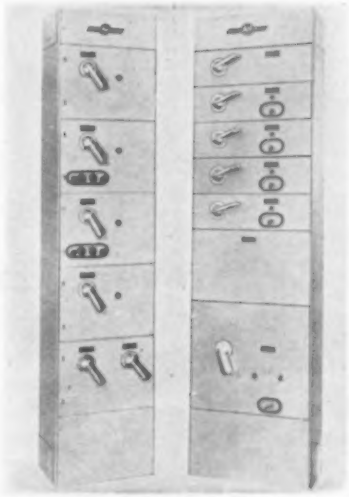
Another Quality Product of BROWN COMPANY

General Sales Offices: 150 Causeway Street, Boston 14, Mass.

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.



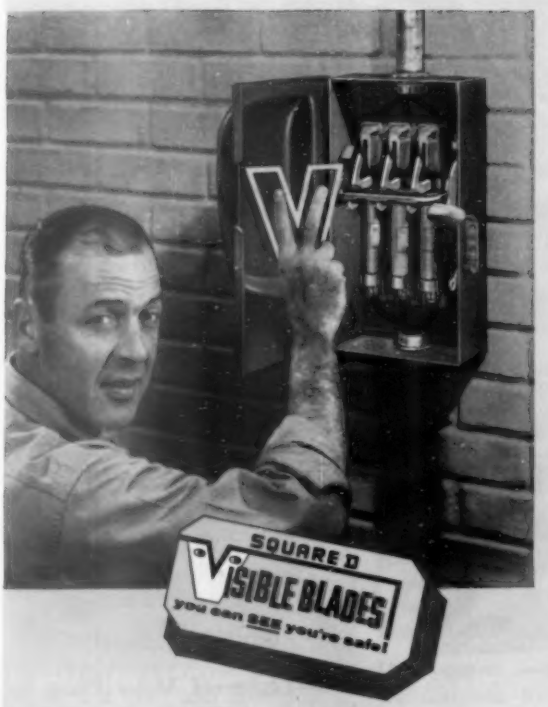
112—Motor Control Center, half the size of most controls, has plug-in units for easy removal or re-assembly. One type provides up to 5 size-1 control cells in 20x90-in. cabinet; another up to 10 size-1 cells in 25x90-in. cabinet. *Arrow-Hart & Hegeman Electric Co.*

113—Safety Ladder has glass-fiber rails with hardwood core and non-slip aluminum rungs. Non-conductive, splinter-proof, chemical- and paint-resistant. Has non-stretch rope that supports 3000 lb.; also safety lock. Legs adjust to uneven ground. *Hopfeld Industrial Mfg. Co.*

114—Two-Pad Vacuum Lifter, for use with jib crane for handling steel plate (to 8x20 ft.) on shear table, has 5000-lb. capacity. Safety tank in beam retains pad vacuum if power fails. Holds material until power is restored or load is released manually. *Vac-U-Lift Co.*

Turn the page

FOR SAFETY YOU CAN SEE REMEMBER THE "V" FOR VISIBLE BLADES!



• The men who pull the switches will tell you what can happen when a switch, ***believed*** to be open —***isn't***. A lot of things can happen—and every one of them is bad. Personnel safety is in jeopardy. Motors can single-phase. Machinery and work can be damaged. Down-time can skyrocket.

Doesn't it make sense to insist on **V**isible **B**lade construction which gives you a road block against any of those possibilities? Doesn't it make equally good sense to insist on the safety switch which gives you that construction—plus a lot of other performance advantages? Evidently it does, because *Square D switches have never been out of first place in more than 50 years!*

They cost no more... why settle for less?

MAIL the coupon for latest Safety Switch Bulletin

Square D Company, Dept. SA-105
1601 Mercer Road, Lexington, Kentucky

Please send me your latest SAFETY SWITCH BULLETIN

NAME_____

COMPANY_____

ADDRESS_____

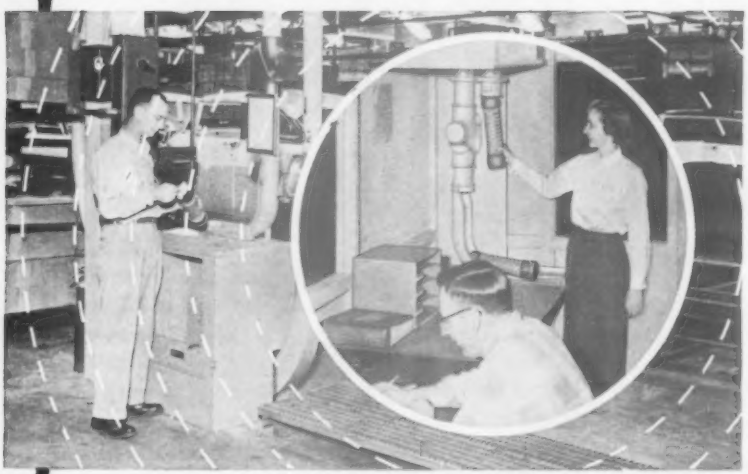
CITY_____ ZONE____ STATE_____

SQUARE D COMPANY

wherever electricity is distributed and controlled

MECHANIZE... PROFIT-WISE!

...with a LAMSON AUTOMATIC AIRTUBE SYSTEM



Now, all departments are but seconds apart and fully informed

If time means money to you – why spend it on paper?
Stop for a moment. Try to estimate how much it costs to send one message from your department to another.

Multiply the costs

Now, envision a system whereby you place your message in a handy carrier, dial its destination, place it in a nearby LAMSON AUTOMATIC AIRTUBE and sit back confident that your message is flying through the air directly to its destination, arriving in a matter of seconds.

Multiply the service

Why not consult a LAMSON Field Engineer. He specializes in inner-communications systems that keep *orders, invoices, records, punch cards, blueprints, small tools, samples, inter-office memos, mail* . . . flying a controlled inner-air route at 25 feet per second, 24 hours a day – AUTOMATICALLY.

Multiply the savings

They will amortize the entire cost of the installation. Simply clip this advertisement to your letterhead for full information about Automatic Airtube Systems and mail to:

LAMSON

PIONEERS *the Conquest* OF INNER SPACE

LAMSON CORPORATION

803 Lamson Street, Syracuse 1, New York

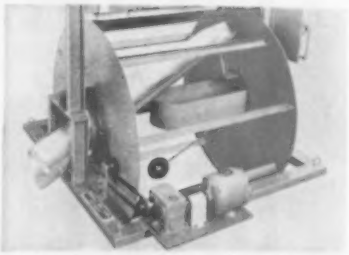
PLANTS IN SYRACUSE AND SAN FRANCISCO • OFFICES IN ALL PRINCIPAL CITIES

Manufacturers of Airtube® (Pneumatic Tube Systems) • Integrated Conveying Systems • Pallet Loaders • Selective Vertical Conveyors • Bookveyors® Clinical • Trayveyors® • Food Service Systems • Blowers and Exhausters • Exidust® Central Vacuum Cleaning Systems • Dryset® Air Vacuum Systems

FACTORY / EQUIPMENT NEWS

Begins on page 108

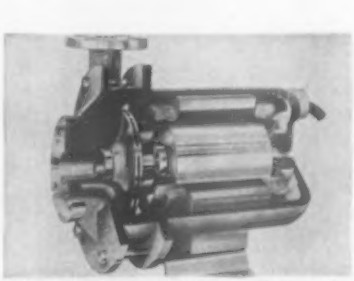
For more about these items, circle item numbers on Reader Service Card next to back cover.



115—Rotary Fluid Filter is compact, yet has large capacity. Contaminants are trapped by eight screens (removed in photo) mounted on rotating drum. Screens are self-cleaning—no filtering media to discard. Needs 40-60 psi. of compressed air. *Murray-Way Corp.*

116—Electrical Actuator permits remote control of Type AB circuit breaker, but doesn't prevent manual operation or interfere with overload safety feature. Rated at 120 to 600 v. a-c, or 125 v. d-c for breakers rated to 100 amp. at 600 v. *Westinghouse Electric Corp.*

117—Pressure Regulator of stainless steel handles many corrosive gases without flaking and eventual destruction. Non-metallic parts are also corrosion-resistant. Maximum inlet pressure of 640 series is 2000 psig., delivery pressure to 125 psig. *Hoke, Inc.*



118—Leakproof Motor Pump for handling dangerous or expensive fluids is completely enclosed. Material handled circulates within motor. Needs no seals, packing, or stuffing box. Mounts at all angles. In ½, ¾ and 1 hp., capacities to 63 gpm. *Robbins & Myers, Inc.*

For more about these items, circle numbers on Reader Service Card next to back cover.

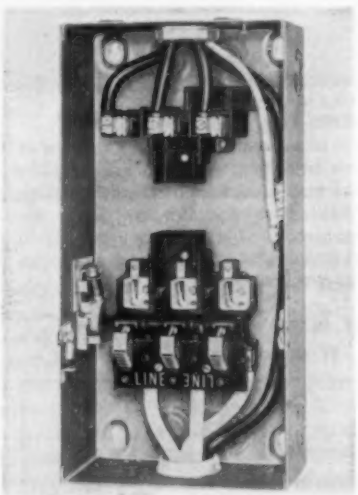
119—Molded Nylon Pulleys, for ¼-, ⅜-, and ½-in.-wide V-belts used in fractional hp. assemblies, have extreme chemical and corrosion resistance. Give adjustable speed control in 2.45 to 1 range. Three sizes to 3¼ in OD, shaft bores to ⅝ in. *Rampe Mfg. Co.*

120—Portable Air Gun quickly sprays, at high volume, material that formerly had to be troweled. Handles Epoloid mastic base coatings, acoustical plasters, stucco, roof coatings, sand finish plasters. Can cover 600 to 1000 sq. ft. per hr. *Rowe Products Inc.*

121—Time Meter shows productive, idle or lost time, and downtime of 10 machines, processes or operations. Monitors at distances to 5000 ft. using 26-volt power. In various time units of minutes and hours. Pilot light shows operating time across room. *Gorrell & Gorrell.*

122—Plastic Pipe carries, without deterioration, hot corrosive liquids and gases to 300 F. at pressures to 150 psig. Easy to clean and install; weather-resistant. In 15-ft. lengths, 5/16 to 9/16-in wall thicknesses, 2- to 12-in. ID. *Cornelius A. Rauh & Associates.*

123—Air Dryer automatically lowers dewpoint of compressed air line to about zero F. with minimum of line pressure drop (less than 2½%). Only moving part is hermetically sealed Freon compressor. For use at ambient temperatures of 40 F. to 140 F. *Drayer-Hanson.*

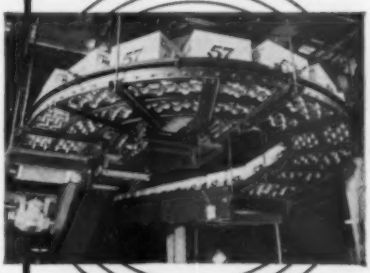


124—Safety Switch, 100 amp., can be installed with lugs at top or bottom. When line conductors enter from below, there's no need to loop wires full length of enclosure. Cuts wiring costs. Especially recommended for bottom-feed applications. *General Electric Co.*

Turn the page

MECHANIZE... PROFIT-WISE!

WITH LAMSON ENGINEERED CONVEYOR SYSTEMS



Engineers Break A Bottleneck

It's True.

Mechanization will increase the capacity of your present buildings and the production of your present equipment. Increased profits will amortize the expense.

But, you need the touch of experienced materials handling engineers to guarantee this result. That is where LAMSON leads all the rest.

During the past 75 years, LAMSON engineers have created more custom engineered conveyor systems that have cut costs, raised production and profits than any other firm. For complete, professional service from problem analysis through installation and beyond, you can depend on LAMSON.

Write LAMSON today for a complete conveyor catalog. It may provide the answer to your materials handling problem. Or, simply clip this advertisement to your letterhead and mail to:

LAMSON

LAMSON CORPORATION

803 Lamson Street, Syracuse 1, N. Y.

PLANTS IN SYRACUSE AND SAN FRANCISCO
OFFICES IN ALL PRINCIPAL CITIES

Circle 430 on Reader Service Card

NOW AVAILABLE . . . Another helpful booklet on a new concept for air control

A comprehensive discussion of the 4 basic principles involved in designing an economical "control by air" system for industrial machines and processes.

Westinghouse Air Circuitry means the *control by air* rather than the mere use of it. It deals with the interlocking, sequencing, timing and segregation of events to obtain automatic or semi-automatic control. It is applicable to any automation problem on any industrial machine . . . in any industrial process. The equipment involves uncomplicated mechanical devices with few moving parts. Any mechanic can easily install and service a Westinghouse Air Circuitry system.

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Fill in and mail the coupon for a copy of this interesting booklet today. If you do not have a copy of our earlier booklet, "Basic Pneumatic Control," check the space indicated in the coupon and we will be glad to send you a free copy along with the new booklet.

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☐ *Basic Pneumatic Control*

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TITLE.....

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FACTORY / EQUIPMENT NEWS

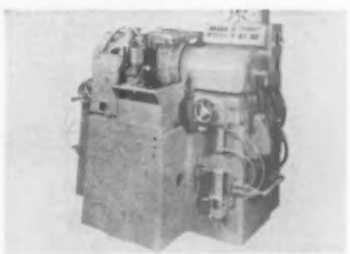
Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

125—Portable Ventilator, combining fan with length of flexible duct, supplies air to cramped or stuffy spaces, vents dangerous fumes, or cools overheated equipment. Three models: 16 in. delivers 4150 cfm.; 12 in., 1540 or 1935 cfm. *Robbins & Myers, Inc.*

126—Vacuum Gage, covering 10-200-mm. Hg absolute range, accurately measures pressure on direct-reading meter. Ideal for remote installations. Unaffected by atmospheric pressure change or exposure. Sending element withstands outgassing, corrosion. *Hastings-Raydist.*

127—Dry-Type Transformer, 3 to 50 kva., single-phase, 600 v. and below, is good for spot load center applications where critical voltage is important for efficient operation of tools, appliances, etc. For indoor use. Compact, easy to install. *Allis-Chalmers Mfg. Co.*



128—Double Spindle Grinder automatically grinds parallel sides of small parts to 0.000025 in. at rate of 5000 to 6000 pieces an hour. A 5-hp. motor drives each of two 15-in.-dia. abrasive disks. Coolant pump, magnetic separator permit wet grinding. *Gardner Machine Co.*

Turn to page 124

ACTUAL TESTS* PROVE

Allen-Bradley Standard Duty Push Buttons can be installed

in about half the time!

In accurately timed tests, Allen-Bradley standard duty push buttons required *about half the installation time*—on the average—than each of four other popular makes. This saving in installation time means "dollars" saved on the job. How come only the famous A-B standard duty push button possesses this time and moneysaving advantage? The answer lies in the molded, wrap-around cover—which also contains the contacts. When the cover is removed, the wiring terminals are *out in the open*—ready for wiring—and you have plenty of working space. The two cover screws are captive—they cannot fall out and get lost. And with the contacts in the cover, they are protected against accidental damage and careless wiring. Naturally, these push buttons have double break, silver contacts that never need service attention. There are two concentric knockouts on each end of the base, which are removed from the *outside*—the heavy, pressed steel base will not bend out of shape.

Your local A-B distributor has these Bulletin 800 push buttons *in stock*. Call him today—you'll save time and money on your next job.

**Using recognized standard duty push buttons, installations were made by an experienced electrician under identical conditions. He was not connected with Allen-Bradley Company in any manner.*

A-B STANDARD DUTY PUSH BUTTONS
Made as a one-, two-, or three-unit station—with pilot light available. Readily changed for horizontal or vertical mounting. Convertible two- or three-way selector switch supplied with or without pilot light.

10-60-M

ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ontario

QUALITY MOTOR CONTROL

A-B QUALITY

ALLEN-BRADLEY
Solenoid Starters give

MORE MILLIONS OF TROUBLE FREE OPERATIONS

. . . and for good reasons

• ONE MOVING PART

With this simple solenoid design, there's virtually nothing to go wrong—all trouble-causing bearings, pivots, and flexible jumpers have been eliminated.

• DOUBLE BREAK, SILVER ALLOY CONTACTS

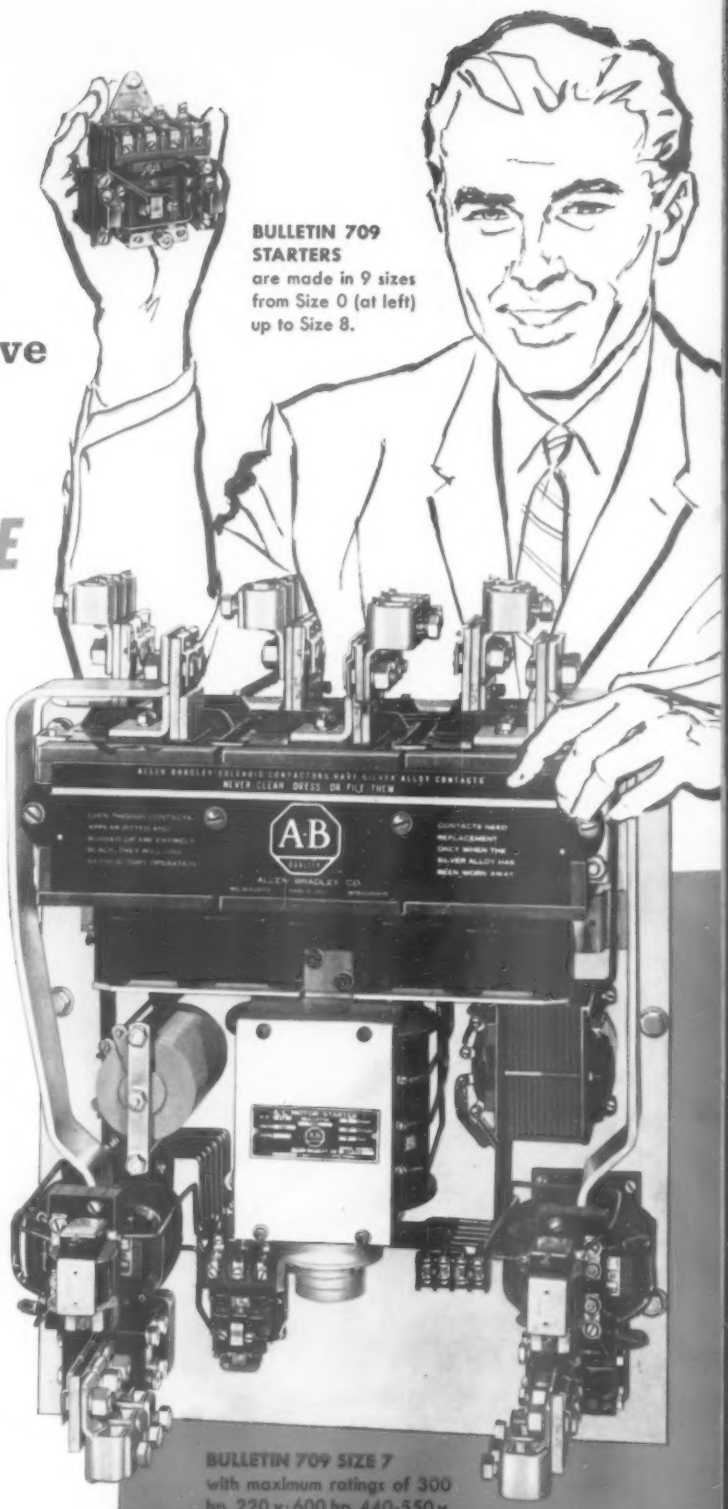
Allen-Bradley silver alloy contacts never require maintenance. They are always in perfect operating condition . . . and remain so until completely worn away.

• SIMPLE UP-AND-DOWN MOTION

The virtually frictionless, straight line vertical motion provides uniform contact pressure at all times—and assures consistent, rapid operation of the contactor.

• RELIABLE OVERLOAD PROTECTION

All A-B starters are equipped with two permanently accurate and reliable overload relays that protect motors against "burnouts." Three overload relays can be furnished.



BULLETIN 709 STARTERS are made in 9 sizes from Size 0 (at left) up to Size 8.

BULLETIN 709 SIZE 7 with maximum ratings of 300 hp, 220 v; 600 hp, 440-550 v.

ALLEN-BRADLEY
MEMBER OF NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

This is for YOU!

Shows you why Clarage's airfoil fan tops all others where it counts...on-the-job

Stable high efficiency where it counts — under actual operating conditions.

That's what you *get* (not just expect to get) with the Clarage Type AF Dynafoil Fan...perfected for mechanical draft and heavy-duty applications such as industrial processes, conduit type air conditioning, tunnel ventilation.

Contact our nearest sales engineering office or request catalog on coupon at right.

Clarage Fan Company
Kalamazoo, Michigan

Please send me Catalog 859 describing Clarage Dynafoil Fans.

Name_____

Firm_____

Address_____

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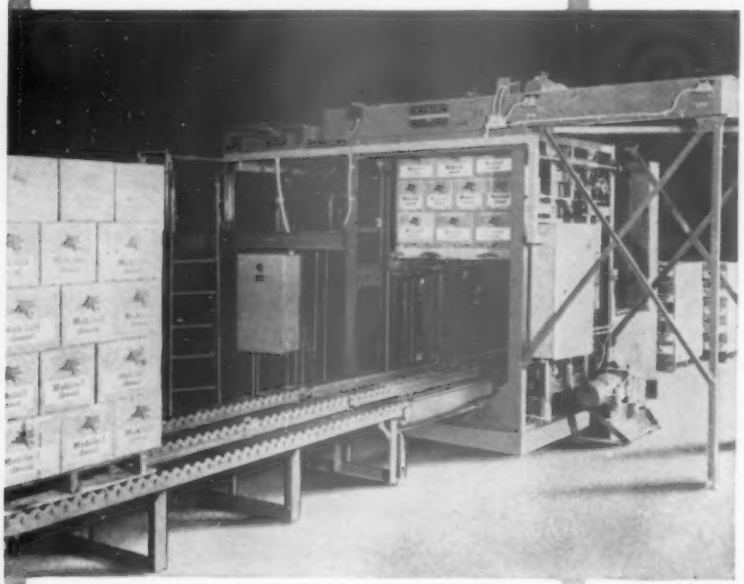
for outstanding performance put MATHEWS METHODS into your mechanized handling program



This machine is one of a complete line of Mathews Automatic and Semi-Automatic Pallet Loaders.

• Whatever your conveying problem might be—if it involves package handling—Mathews will build the equipment to do the job best for you.

You'll get a complete conveyer service, from proposal engineering through installation, and equipment that will deliver outstanding performance.

That is why we believe you get the most for your money when you buy Mathews Conveyers.

GENERAL OFFICES ..... MATHEWS CONVEYER COMPANY
Ellwood City, Pennsylvania
WESTERN DIVISION ..... MATHEWS CONVEYER COMPANY WEST COAST
San Carlos, California
CANADIAN DIVISION ..... MATHEWS CONVEYER COMPANY, LTD.
Port Hope, Ontario, Canada

Over Fifty Years of Leadership in Mechanized Handling

MATHEWS

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

129—Time-Speed Recorder charts short-duration events to millisecond accuracy to spot hidden trouble in machine operations and processes. Split-second timer shows time of day event occurred along chart's edge; duration recorded by pen sweeping across chart. *R. B. Annis Co.*

130—Long-Life Battery, for light-duty service in small trucks, maintenance carts, sweepers, etc., has 4-year service life. Plates, three times thicker than those of automotive batteries, give 180-amp./hr. capacity at 20-hr. rate of discharge. *Electric Storage Battery Co.*

131—Worm Gear Reducer, fan-cooled for top thermal capacity, has detachable feet for unlimited mounting. In 12 sizes with center distances from 1⅛ to 8 in., input capacities from 0.01 to 68 hp., output torque to 46,000 in.-lb. *Foote Bros. Gear & Machine Corp.*

Turn the page

For more facts Circle 434 on Reader Service Card

For more facts Circle 435 on Reader Service Card ➤

FIRST with the Solution

Stromberg pioneers a new concept of accurate, instantaneous data transmission and collection to bring all departments and operations under top management's constant supervision with the Transacter* System.

GENERAL TIME CORPORATION

STROMBERG DIVISION • THOMASTON, CONN.

*TRADE MARK OF G.T.C.

"KEX" Wiping Towel Service used for over ten years by Major Oil Industry in California

SHELL OIL COMPANY

STANDARD OIL COMPANY OF CALIFORNIA

TIDEWATER OIL COMPANY

UNION OIL COMPANY OF CALIFORNIA

These companies choose "KEX" Wiping Towel Service because ever-ready "KEX" boosts efficiency. Regular pick-up, regular delivery . . . national service, national quality control are assured.

"KEX" Wiping Towel Rental Service is so flexible that these superior wiping cloths can be supplied as needed, to provide for peaks and lows in production. Obviously, this feature means lower costs in procurement, transportation, storage, and handling charges.

Discover how "KEX" Service can benefit you. These California companies are serviced by Shop Towel Service and Supply, 317 Victory St., South San Francisco, California.

See "Wiping Cloths" or write to "KEX" National Service, 295 Fifth Avenue, New York 16, N. Y.

"KEX" REG. U.S. PAT. OFF. NATIONAL SERVICE

It isn't "KEX" unless it's imprinted with the "KEX" name.

For more facts Circle 436 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

132—Flaring Tool, in three models, is said to produce uniform and perfect 45- or 37-deg. flares quickly and easily on copper, aluminum, and brass tubing. All working parts are locked together so they cannot become separated or lost. Ruggedly built. *The Ridge Tool Co.*

133—Low-Cost Electronic Counter actuates equipment at pre-set count from 2 to 100 at over 1000 operations per min. Instantly resets to zero. Actuation is by limit switch, magnetic or toggle switch, relay, or photoelectric controls. Price: $148. *Standard Instruments Corp.*

134—"Duo-Flow" System can accurately meter a wide range of two-part compounds to 20,000-cps. viscosity, 5 parts per hundred to 50-50 epoxies, polyurethanes, polyesters, and foam. Portable, easy-to-clean, consists of pump, meter, and spray gun. *Pyles Industries, Inc.*

Turn the page

PICK YOUR IMPELLER, PICK YOUR PUMP

Of course, you never bought an impeller and then bought the pump later. But 'pick your impeller, pick your pump' is one way of suggesting you put *performance* before *standardization*.

Sure, we can give you pumps from a complete standardized line. We can, for example, show you how four basic frames are used in six different pump types and 127 different models. And we can show you one bearing that spins in 51 different sizes, or one shaft that turns in 39 sizes. So far as we know, there's no more standardized line of centrifugal pumps than this.

But we can't help reminding you that the day-to-day economy of any pump lies in its operating efficiency plus how close it comes to meeting your exact performance requirements. Only after these conditions are met does a minimum number of parts lying in your storeroom really count.

So, to you it's most important that this line of Worthington SESC pumps contains more (not less) different types of impellers than any other line. It contains open, closed and semi-open impellers. Each is available in five different materials to handle abrasive or corrosive materials, water or slurries. In fact, because of the extensive impeller selection, this line offers a 'customerized' pump selection meeting more specific performance requirements than any other line.

But don't take our word for it. Take a look at the SESC pump line. You'll see it's standardized to the nth degree in ratings up to 3000 gpm and 550 ft. heads. But there are more impellers to choose from . . . thus you can buy a custom built pump at standard prices.

For the name of your nearest Worthington distributor consult the Yellow Pages or write Worthington Corporation, Section 20-18, Harrison, New Jersey.

WORTHINGTON

For more facts Circle 437 on Reader Service Card

9

MAJOR IMPROVEMENTS IN THE WAYNE 703 POWER SWEEPER

AT NO INCREASE IN PRICE

Now you can get the completely re-designed and improved Wayne 703 Power Sweeper . . . *at no increase in price!*

- New larger engine—5¾ horsepower
- New dual traction and broom drives
- New long-life synthetic brushes
- Relocated oil-bath air cleaner
- New super-quiet muffler
- Quick-remove engine access panel
- Rugged wrap-around bumper
- Optional LP gas kit
- Optional water muffler

The 703 is a fast, maneuverable, walk-behind sweeper that cleans up to 40,000 square feet per hour, indoors or out. It's ideal for factories, parking lots, warehouses, garages—any hard-to-sweep, congested area. If you want to see what Wayne power sweeping can do for you—ask for a demonstration!

WAYNE

WAYNE Manufacturing Co.
3309 East Lexington Street
Pomona, California

☐ I'd like to see the 703 demonstrated
☐ Send me complete information on the 703

Name_____ Title_____
Address_____
City_____ Zone___ State_____

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

135—Lift Truck, 4000-lb. capacity, travels in any direction with any shaped load. Steers around corners; stacks at right angles. Lever controls forward and reverse turning; steering wheel controls angle and side travel. Forks swing 30 deg. *Automatic Transportation Co.*

136—Cathodic Current Control automatically adjusts voltage to optimum settings to protect underground structures and equipment, etc., against corrosion. Visual and audio alarms signal malfunction. Can be adapted to existing or new systems. *Electro Rust-Proofing Corp.*

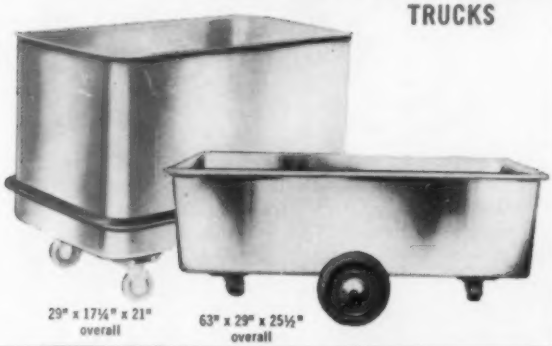
137—Metal-Arc Welder can spot-weld 0.030- to ¼-in. mild steel, galvanized carbon steel, stainless, aluminum, etc., from one side only. Plug-welds ⅛-in. metals, and also space-, tack-, and bead-welds. Produces over 20 spots per min. Little spatter. *Hobart Bros. Co.*

Turn the page

cut handling and storage costs...

WEAR·EVER ALUMINUM

TRUCKS



29" x 17¼" x 21" overall

63" x 29" x 25½" overall

MOBILE BINS

38 gallons

30 gallons

27 gallons

STORAGE DRUMS

50 gallons

30 gallons

4, 6, 9 and 14 gallons

TRANSPORT BOXES

34 3/16" x 16⅛" x 12"

22⅛" x 20½" x 6½"

UTILITY ITEMS

16, 21, 48, 63, 74, 122 qts.

18, 24, 32, 48 ozs.

10, 12, 14, 16 qts.

2 qts.

KETTLES

Steam-Jacketed 20, 30, 40, 60, 80, 100, 150 gals.

Gas-Fired 20, 30, 40 gals.

Steam-Jacketed 20, 30, 40, 60, 80, 100 gals.

Now you can speed production, and simplify your handling or storage problems with standard, readily available Wear-Ever plant service items like these.

Wear-Ever's complete line of handling, storage and service equipment is constructed from specially developed, tough, hard-wrought aluminum alloys to assure longer life.

Send for your free copy of our new catalog showing the complete Wear-Ever line.

New Catalog Ready! *SEND TODAY!*

Wear-Ever Aluminum, Inc.
508 Wear-Ever Building, New Kensington, Pa.

GENTLEMEN: *I'd like to learn more about ways in which Wear-Ever's line can help me.*

☐ Send me your catalog ☐ Have your representative see me

NAME_____

TITLE_____

COMPANY_____

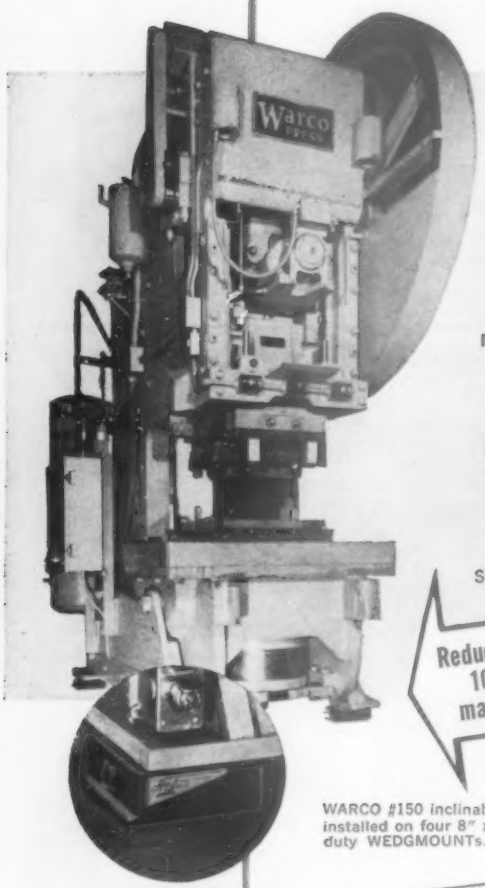
STREET_____

CITY_____ ZONE____ STATE_____

WEAR·EVER ALUMINUM, INC., FOOD SERVICE EQUIPMENT DIVISION, NEW KENSINGTON, PA.

NO MORE ANCHOR BOLTS
TO HOLD YOUR MACHINES

WHEN YOU USE THE *Air-Loc*® METHOD



You just set the machine on Air-Loc mounts and it operates without vibration and at a greatly reduced noise level. Patented Air-Loc grips the machine to the floor.

New WEDGMOUNT with Air-Loc on top and bottom provides instant precision leveling of your precision machines such as lathes, surface grinders, etc.

Reduce machine sway with 100% contact between machine foot and mount.

WARCO #150 inclinable punch press installed on four 8" x 8" heavy duty WEDGMOUNTs.

Send for the free bulletin which describes this low-cost way to get improved machine performance with less noise.

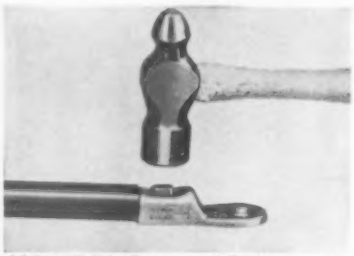
Clark-Cutler-McDermott Co.
108 W. Central Street · Franklin, Massachusetts

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

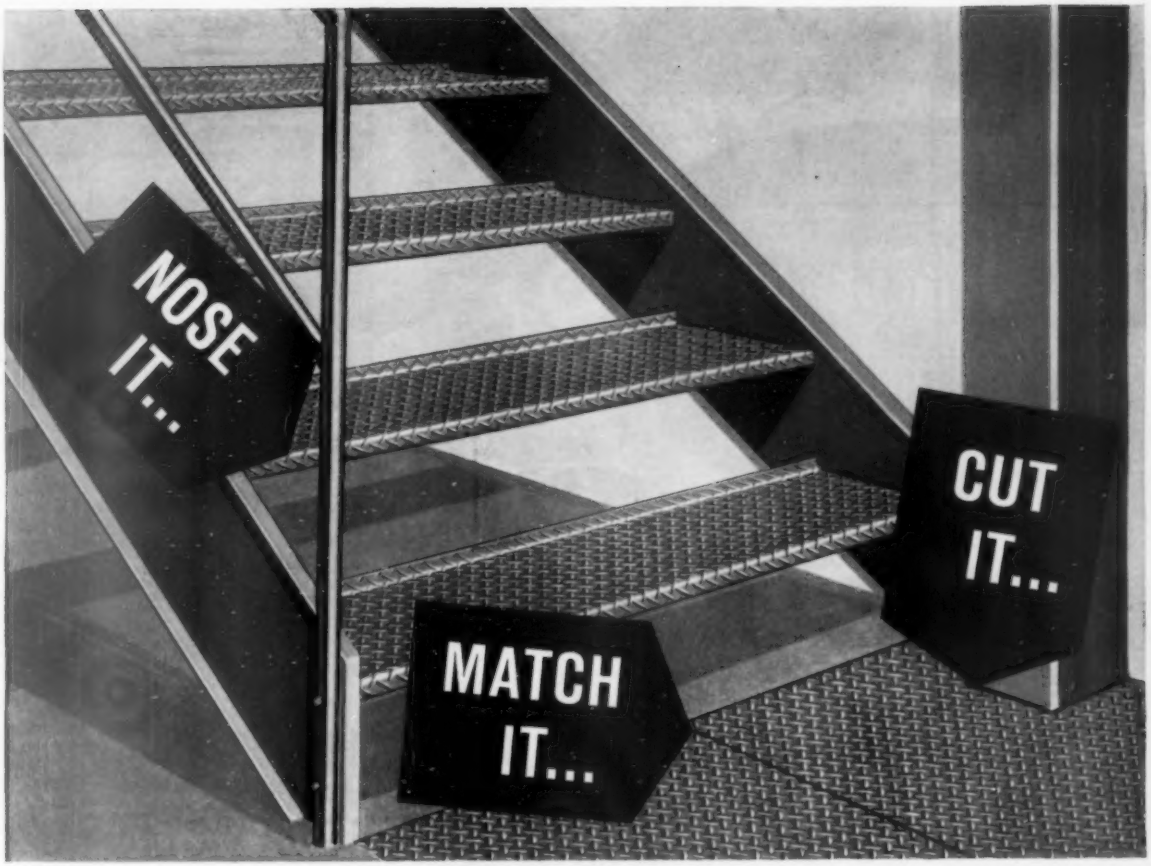
138—Portable Power Scraper strips coating from equipment, tanks, floors, other surfaces without clouds of dust and grit to contaminate machine parts. Four blades, with 192 cutting surfaces, make removal simple. Easy to maintain. Lightweight. *Roto-Scraper Co.*



139—Cable Lugs and Splicers make connections in seconds with a hammer. No crimping tools, wrenches, soldering equipment. Just insert stripped cable in lug, then hammer down self-contained impact punch. Sizes: Nos. 6 to 1, 1/0 to 4/0. *Bernard Welding Equipment Co.*

140—Lift Gate for conveyors uses oil/air-operated control valves to raise or lower unit. Can be equipped with remote control buttons for operation from distant point. Comes in sections to 10 ft. long, 36 in. wide for roller or wheel conveyors. *Sage Equipment Co.*

Turn the page

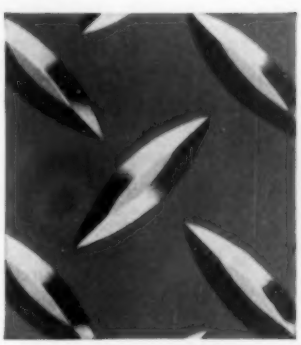


Alan Wood Super Diamond floor plate ...is easy to fabricate

Here's a heavy duty floor plate that can be sheared, formed, welded, and easily matched. The arrangement of the unique A. W. Super Diamond pattern allows you to bend it at any place.

A. W. Super Diamond will last for years... provides a safe, non-skid footing at all times. Easy to clean? A. W. Super Diamond can be swept, hosed or mopped easily . . . from any angle.

For easy fabrication and installation... for safety... for long wear ...specify A. W. Super Diamond. Write for Bulletin SD-S10.



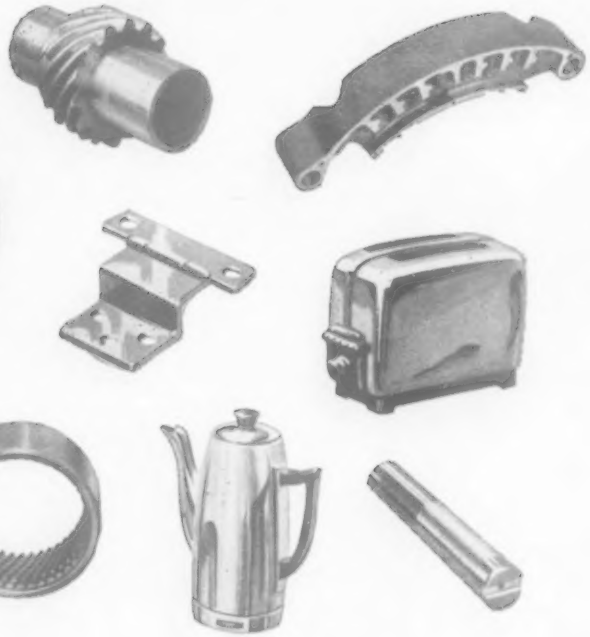
ALAN WOOD STEEL COMPANY

Conshohocken, Pa. • STEEL PRODUCERS WITH THE CUSTOMER IN MIND

DISTRICT OFFICES AND REPRESENTATIVES: Philadelphia • New York • Los Angeles • Boston • Atlanta Cincinnati • Cleveland • Detroit • Houston • Pittsburgh • Richmond • St. Paul • San Francisco • Seattle Montreal, Toronto and Vancouver Canada: A. C. Leslie & Co., Ltd.

For more facts Circle 441 on Reader Service Card

Have a Metal Cleaning Problem



Detrex Engineers Have Been Coming Up With "Cost Saving" Answers for 30 Years

Every metal cleaning operation has its own particular problems—but they're seldom new to the Detrex engineer. With 30 years of experience, he can produce the right formula to insure maximum productivity and economy in your operation.

He will analyze your product, the type of soil to be removed, the proper equipment and cleaning agent needed, the space and manpower required—every factor that bears on the problem.

When he gives you his recommendation, you can depend upon it to make sense—and save dollars. And when you put his recommendation into practice, you can depend upon Detrex to follow through with the finest service in the business.

Depend on DETREX for Every Metal Cleaning and Processing Need

- PERM-A-CLOR NA (Trichlorethylene)
- Solvent Degreasers
- Ultrasonic Equipment
- Industrial Washer
- Phosphate Coating Compounds
- PAINTBOND Compounds
- Aluminum Treating Compounds
- Alkali and Emulsion Cleaners
- Rustproofing Materials
- Extrusion and Drawing Compounds
- Spray Booth Compounds

Write for your free copy of Dr. C. E. Kircher's informative paper: "Solvent Degreasing—What Every User Should Know."

DETREX CHEMICAL INDUSTRIES, INC.

Box 501, Dept. F-860, Detroit 32, Michigan

World's Largest Exclusive Producer of Cleaning Chemicals and Equipment

For more facts Circle 442 on Reader Service Card

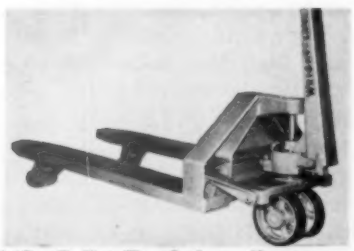
FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

141—Mobile Exhauster, mounted on rubber-wheeled cart, cleans air of gases, fumes, smoke, heat. Receptor intake has lifetime magnetic base that holds fast to work or metal. Up to 24 ft. of tubing can be used to discharge fumes from area. *Car-Mon Products, Inc.*

142—Epoxy Motor Insulation for both random- and form-wound motors of 1 to 500 hp. is said to be first insulation of this type offered in motors of high hp. ratings. Maintained high level of insulation resistance and dielectric strength during water tests. *Elliott Co.*



143—Pallet Truck has all-purpose handle that raises or lowers gently or rapidly, and steers, pushes, and pulls. Squeezing handle control lowers truck, pumping raises it—while in motion, if necessary. Capacities: 2000 to 6000 lb. *Wright-Hibbard Industrial Truck Co.*

Turn the page

Circle 443 on Reader Service Card ➤

"Tough buyers" demand Reznor

NEW AUTOMATIC VENTER

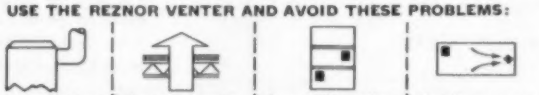
lets you install Reznor money-saving unit heaters where you couldn't before!

Now, with the Reznor Venter, you can enjoy the economies of Reznor direct-fired unit heaters anywhere in your plant. Venting problems are solved; and you'll avoid the expense of boiler, piping and controls.

The Venter, exclusive with Reznor, is a motorized vent exhauster that mounts directly on the heater. A 4-inch diameter vent pipe is all that's necessary to carry burned gases to a sidewall—or down through the floor and out, if you choose. No more costly roof venting or big, expensive flues. Heaters operate more efficiently, too, especially if the room has an exhaust fan which creates a negative pressure.

There's a Venter for all Reznor Heaters up to 300,000 Btuh. Ask your representative for Catalog SA-5900, with data on all Reznor Heaters and the new Venter. Or write Dept. 75-T, Reznor Manufacturing Co., Mercer, Pa.

USE THE REZNOR VENTER AND AVOID THESE PROBLEMS:



REZNOR HEATERS

"WORLD'S LARGEST SELLING DIRECT-FIRED HEATERS"

New LOW COST PER YEAR for maintenance painting with METALASTIC®!

Fortify a primer with FOUR protective pigments. Build in special "wetting" action to saturate and seal rough surfaces. Cover with tough, elastic, premium enamel made with chemical and fume-resistant pigments for *all* colors—and you have new, long-lasting protection for *any* exposed metal surface!

Sherwin-Williams METALASTIC Primer and METALASTIC Enamel incorporate new advances in paint chemistry that mean lower per-year costs for industrial maintenance painting, even under unfavorable conditions of application or surface preparation. New light, bright colors *stay* light and bright. Long-oil formulation insures long-lasting durability. And high-solids content gives longer-lasting high film build even on protruding edges and corners.

Get all the facts on METALASTIC—see the new METALASTIC colors! Call your local Sherwin-Williams Branch—in all principal cities. The Sherwin-Williams Co., Industrial Maintenance Division, Cleveland 1, Ohio, or Montreal, Canada.

☐ Send booklet "How To Save"

☐ Send more facts on METALASTIC

Name_____

Company_____

Address_____

City_____

How to Save SAFELY When Painting Your Plant

This free booklet tells how... shows *what* to use *where*. Send for it, together with more facts on METALASTIC.

SHERWIN-WILLIAMS

MAINTENANCE FINISHES

For more facts Circle 444 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.

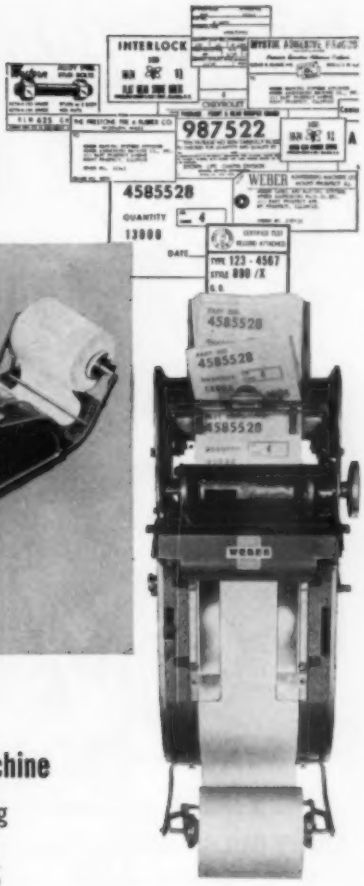
144—Mobile Dust Control system dispenses from 1 to 11 gpm. of non-toxic solution for single-point dust suppression or controlled wetting of raw materials. Self-contained or attaches to plant water supply. Two manual and two automatic controls. *Johnson-March Corp.*

145—Electronic Tapwelder joins resistance alloy wires of 0.025 to 0.0007 in. dia. at production-line speed. Operator selects, from direct reading meter, correct voltage for wire, then welds by pressing foot-switch and placing tap lead against coil turn. *Hanjohn Co.*

146—Portable Dust Collector fits on 20- or 24-gal. waste can. Traps dust, shavings, chips, etc. Returns clean air to circulation. Low-cost, economical to use. Heavy particles drop to bottom; fine dust goes into after-filter bag. *Cincinnati Fan & Ventilator Co.*

Turn the page

STOP BUYING LABELS



Print your own

... on a Weber Label Printing Machine

- save hours and hours of typing
- eliminate label inventories
- cut your label costs up to 90%

Save expensive hours of typing individual forms and eliminate addressing errors. Eliminate high-cost, wasteful, volume purchasing, storing and inventorying of labels—the Weber Label Printer will run them off when and where you need them.

The compact portable, typewriter-size, fully automatic machine prints, counts, cuts to size, and stacks labels—at 105 per minute! It adjusts in seconds for different sizes and varieties of labels used in shipping, production, packing, inspection and other departmental work. Prints from stencil or rubber mat on gummed, ungummed, dry gummed, linen or pressure sensitive stocks.

Whatever the variety or quantity, you can now print all your label needs quickly and easily on a Weber Label Printing Machine. Get the facts on how you can save up to 90% on your label costs—mail coupon!

You get 7 Big Advantages

- No more buying labels
- No more typing labels
- No more label inventories
- Reduce claims
- Reduce theft and overshipment losses
- Address faster
- Ship faster

Weber
MARKING SYSTEMS
Sales and Service in all principal cities

WEBER MARKING SYSTEMS
Dept. 17H
Weber Industrial Park
Mount Prospect, Illinois

Please send me complete data on Weber Label Printing Machines.

Company_____
Individual_____
Position_____
Address_____
City_____ Zone____ State_____

For more facts Circle 445 on Reader Service Card

Facts of Light!

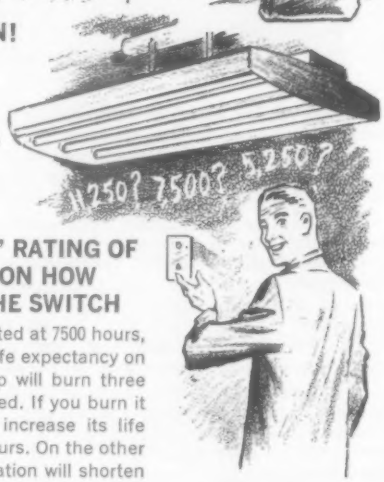
CHAMPION Lamps

TUBES ARE MORE ECONOMICAL THAN BULBS BUT —

For lighting systems in general, incandescent lamps have a relatively low initial cost and a relatively high operating cost. Just the reverse is generally true for fluorescent lamps. In the long run, fluorescent lamps prove the most economical. In the average school building, for instance, fluorescents begin to be more economical in from 3-4 years. However, incandescents would provide the most light for an initial expenditure.

LIGHT BULBS ARE A BARGAIN!

50 years ago a 100 watt bulb cost $1.45. In fact, if 1910 production methods attempted to supply today's demand, a 100 watt bulb would cost about $4.10. Today, you can buy a much better 100 watt bulb for 25 cents list.



THE "7500 HOUR" RATING OF A LAMP DEPENDS ON HOW OFTEN YOU FLICK THE SWITCH

When a fluorescent lamp is rated at 7500 hours, the manufacturer bases this life expectancy on the assumption that the lamp will burn three hours for every time it is started. If you burn it ten hours per start you will increase its life roughly 50% to about 11,250 hours. On the other hand, one-hour per-start operation will shorten its life to about 5,250 hours.

MANY COST-SAVING HINTS IN THE CHAMPION LIGHTING MAINTENANCE MANUAL

This manual explains the principles and advantages of good lighting practice in 48 pages. Included are sections on group replacement of lamps, cleaning programs and a guide to trouble shooting fluorescent installations. This is the latest edition of a guide that has proved to be of great practical value to lighting men everywhere. Write for a free copy.

CHAMPION LAMP WORKS, Lynn, Massachusetts

CHAMPION INCANDESCENT-FLUORESCENT • *YOUR BEST BUY IN LAMPS*

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

147—Inspirator Burner produces instant flame and burns with pulsating action. For use with high-pressure gas (5 lb. or more). Has 20,000 to 1,500,000 Btu. range. Burner explodes fuel to produce high heat and efficiency, saves up to 30% fuel. *E. W. Bliss Co.*

148—Thermistor Probe, with spring-loaded depth guide, takes temperature of non-rigid masses such as rubber, food, plastics. Sheath protects needle tip when not in use. Readings to ¼ deg. from 32 to 410 F., are accurate from 0.2 to 0.7% of scale. *Atkins Technical, Inc.*

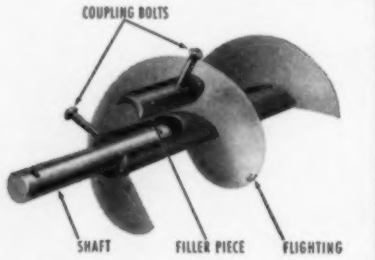
149—Gas Blender automatically mixes two gases for process streams and heat treating. Changes from one mixture to another in 10 min. Chart records atmosphere of each job, so you can duplicate successful process. No need to store cylinder mixes. *Gow-Mac Instrument Co.*

150—Grinding Machine Headstock is said to achieve highest possible accuracy for roundness and end camming. Unique hydrostatic bearing design makes this possible. Company claims you can grind round within 10-millionths with this headstock. *Brown & Sharpe Mfg. Co.*

Turn the page

How Quik-Link conveyor screws

KNOCK DOWN DOWNTIME



HOW IT WORKS — First, coupling bolts and filler pieces are removed from each end of screw section to be replaced. Then the hanger is unbolted, and entire section lifted from trough.

Only LINK-BELT Quik-Link lets you remove a single section without disturbing other components

Here's how you can side-step a serious production bottleneck. Quik-Link offers the fastest method yet of replacing a damaged screw and putting the conveyor back into service. Just a fraction of the normal time.

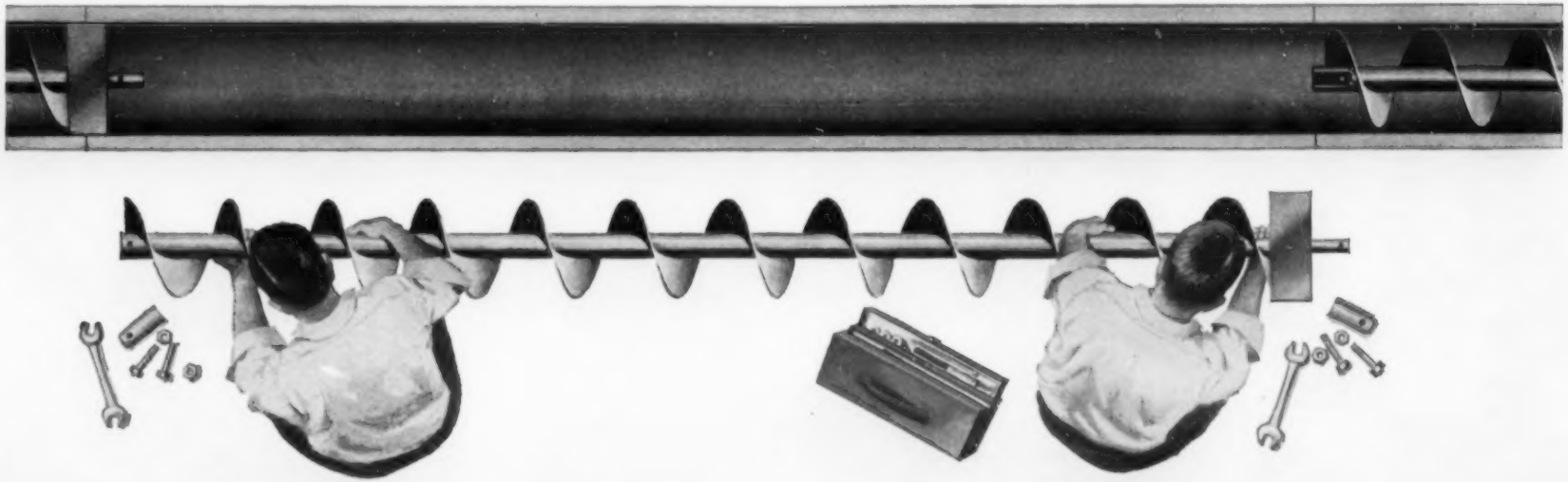
That's why it's time you investigated the "down-time insurance" built into every section of Link-Belt Quik-Link conveyor screws. Your maintenance men become quick-change artists in no time—a wrench and 30 minutes change the damaged screw section and put the conveyor back to work. What's more, there is no need to pull down the entire line . . . no need to disturb other conveyor components.

Quik-Link is just one of a whole group of Link-Belt screw conveyor components that are cutting maintenance and power requirements to the bone. For full facts call your nearest Link-Belt office or authorized stock-carrying distributor. Or write for Book 2989.

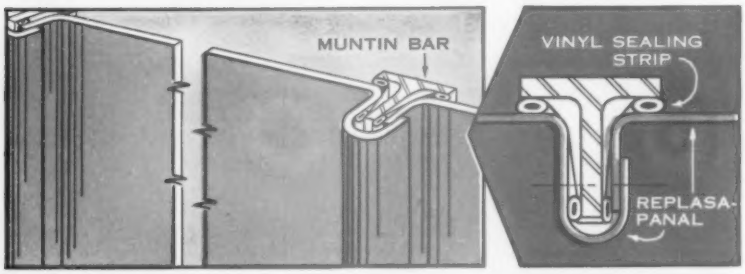
LINK-BELT

SCREW CONVEYORS 15.230

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World.

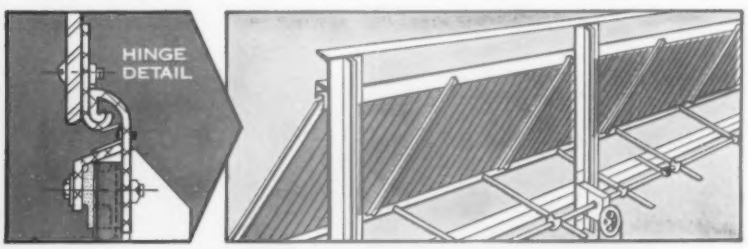


New Replasa-Panal Solves Old Glazing Problems



One of your own men can now quickly replace your broken glass with shatterproof fiberglass reinforced plastic panels that have the best light transmission quality money can buy. Replasa-Panels are specially formed to be easy to store and carry, install quickly, and make a secure, weather-tight job, yet they cost no more than ordinary wire glass. No cutting, fitting, or face puttying!

This is your finest assurance against broken glass and leaky skylights and windows, for either top-hinged or fixed sash, when muntin bars are still usable as a frame. For complete information and prices, mail in the coupon below.



OR, IF ENTIRE SECTIONS OF SASH NEED REPLACING, use Aluma-Sash

We have installed hundreds of thousands of feet of this complete sash replacement system, consisting of top quality translucent plastic and a continuous aluminum hinged frame designed for years of rugged service, at the lowest possible contract price. Write for details.

Stylux BY BUTLER

Our superior fiberglass reinforced plastic panels are made from Butler Stylux, the acrylic-fortified panel that has been job-proved for outstanding durability, weather endurance, and light transmission. We carry the entire Stylux line, and can ship direct to you. Mail this coupon today!

H. A. HARRY GLASS COMPANY 1644 Milwaukee Ave., Chicago 47, Ill. Phone: DIckens 2-1660

40 years experience in solving industrial glazing problems.

Please send price information and detail drawings. We are interested in: (check one or both)

☐ Replacement of individual glazing units by plant's own crew (Replasa-Panal)

☐ Replacement of entire sash sections (Aluma-Sash)

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

Replasa-Panal & Aluma-Sash—Patents Pending, Trade Marks H. A. Harry Glass Co.
Stylux—Reg. U.S. Pat. Off., Butler Manufacturing Co.

FACTORY/EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

151—Air Grinder adjusts to any operating speed between 16,000 and 25,000 rpm. for work on plastics, aluminum, and other non-ferrous metals, steel, etc. Two models drive small wheels, rotary files, carbide burrs, routers, sanding or cutting dies. *Thomas C. Wilson, Inc.*

152—Temperature Monitoring system shows at a glance ambient temperatures from −50 to +300 F. in remote areas. Records to ±1% accuracy. Sensor probes are effective on cables up to 4000 ft. long. Cables plug directly into rear of indicating panels. *Royco Instruments, Inc.*

153—Air Dryer cools compressed air to 40 F. at pressure to remove moisture and oil vapor. Achieves atmospheric dewpoint as low as −5 F. No prefilters or aftercoolers. Operates continuously without cycling or on-off service. Low operating costs. *Hankison Corp.*

Turn the page

PICTURE THE PLACES WHERE YOU CAN USE LION Nōkōrōde. PROTECTIVE COATINGS

Do you need a non-breathing moisture-vapor barrier over insulation or to protect metal, masonry or other surfaces against atmospheric corrosion, weathering or immersion in water? Use Lion Nokorode Seal Kote.

Do you need an *insulating* coating which will deliver enough heat saving in one year to pay for its cost—plus protecting against corrosion and moisture penetration? Use Lion Nokorode K Kote.

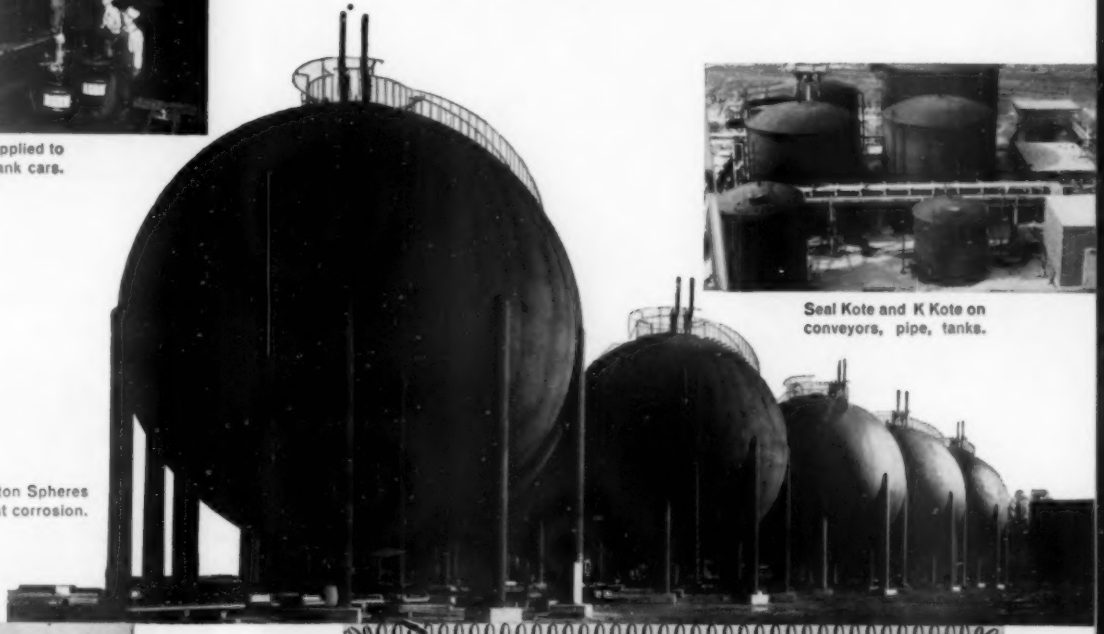
These tough, durable coatings can be sprayed onto regular or irregular surfaces—faster than most coatings, with proper equipment. They adhere at any angle, and change shape without rupturing.

Lion Nokorode Coatings—as complete a line as you can find—are the products of continuing research by Lion and its parent company, Monsanto Chemical Company. Lion Nokorode products have been proven in use around the world, and are constantly being improved in the light of research and use.

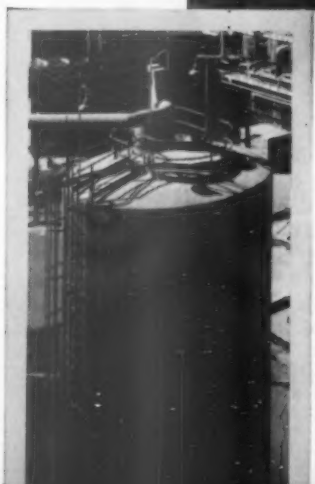
Lion offers you on-the-job helps and the most complete file of technical literature in this field. Tell us your problem. We will send you the technical information which applies. Just mail the coupon below.

Seal Kote being applied to liquid chemical tank cars.

Seal Kote and K Kote on conveyors, pipe, tanks.



Seal Kote on Horton Spheres to prevent corrosion.



K Kote on soap and black liquor tanks at pulp mill.

Protective Coatings Section
LION OIL COMPANY
A Division of Monsanto Chemical Company
El Dorado, Arkansas

My protective coatings problem is.....

.....

Please send me the appropriate technical literature.

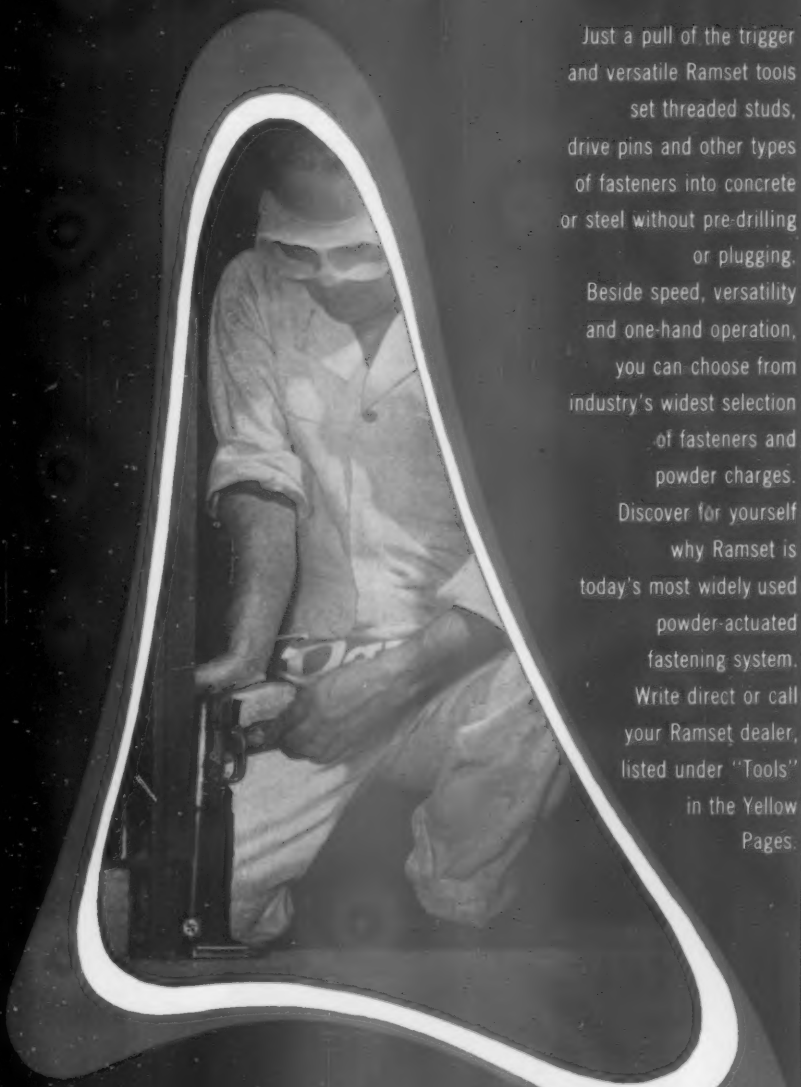
NAME.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

Cost-conscious maintenance men use Ramset



Just a pull of the trigger and versatile Ramset tools set threaded studs, drive pins and other types of fasteners into concrete or steel without pre-drilling or plugging. Beside speed, versatility and one-hand operation, you can choose from industry's widest selection of fasteners and powder charges. Discover for yourself why Ramset is today's most widely used powder-actuated fastening system. Write direct or call your Ramset dealer, listed under "Tools" in the Yellow Pages.

WHERE SPEED IS VITAL

Ramset® Fastening System

OLIN MATHIESON CHEMICAL CORP. · WINCHESTER-WESTERN DIV. · 288-H WINCHESTER AVE. · NEW HAVEN 4, CONN.

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

154—Portable Hand Gun uses electrostatic principle to apply metallic and non-metallic paints and coatings on large or small items. Little overspray. Installs easily into existing systems. Quick color changes possible. Little maintenance. *Ionic Electrostatic Corp.*

155—Radiant Heat Panel, measuring 1x4 ft., has bright nickel-plated steel grille that reflects over 80% heat. Insulation between reflector and panel back reduces heat loss. Mounts in multiples in large areas. Comes in 4- and 6-kw. models to 240 v. *Edwin L. Wiegand Co.*

156—Rubber Swing Doors "give" when pushed open by power trucks, without damage to truck load. Outlast rigid doors. Simply constructed to fit any size opening. Come with Plexiglas vision windows, air seal. Optional: hinges with magnet closure. *The Peelle Co.*

Turn the page

◀ Circle 450 on Reader Service Card

View of part of building served by the Cleveland Tramrail window washing and building maintenance system. This is in a large, beautiful campus-like setting.

One Man Washes 783 Windows In 30 HOURS

The window washer works speedily and safely in this cage. By depressing push buttons in cage, he can move to any part of building. There is no disturbance to delay busy people inside.

Both of window-washing units are seen in use here. Man at extreme left is painting and man at right is caulking around the windows.

ALL the windows in a large office building, housing over 3000 people, are kept sparkling clean by one man. All of the 783 windows are 5'0" x 7'0", except those at the stair wells, which are larger. They are of single light design, sealed solidly into the frames and cannot be opened.

Most of the building is three stories high, but some sections are four stories. To obtain large window exposure, the building is of multiple or joined-H design. The entire building has a 36 inch roof overhang into which is secured the hanger rod supports for the Cleveland Tramrail track which completely encircles the building, the trackage being approximately 2900 feet long.

There are two motor-driven window washing units. All operations are controlled from the cage of each. The washer may travel in either direction along the building wall and raise or lower himself to any level. Obviously he can move from window to window quickly and tirelessly.

The Tramrail system was very helpful during construction of the building. It greatly speeded window installation, caulking and painting. In addition to providing safe window cleaning at very low cost, the system is of course useful for all outside wall maintenance.

Write for free illustrated booklet No. 2022

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

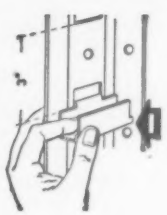
CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 3253 E. 290 ST. • WICKLIFFE, OHIO

You can't tell how good a dinner is until you eat it . . .

But you CAN tell how good a shelving is if it's

BORROUGHS STEEL SHELVING

YOU KNOW right from the start what you're getting when you buy Borroughs Steel Shelving. You get quality, efficiency and special features that make Borroughs a big name in shelving from coast to coast. Borroughs Steel Shelving gives you rugged durability—complete flexibility—easy assembly—simple adjustability. Entire units can be assembled without special tools—shelves can be installed or adjusted without nuts or bolts—any unit or shelf can be moved independently of any other. Get more facts—



send for catalog

Represented in Sweet's Catalog, Plant Engineering File 4G BO

Insert 4 shelf support brackets . . . no fumbling with studs, bolts, nuts or lock washers.

and then

Tilt shelf into support brackets . . . and shelf is ready for loading.

BORROUGHS MANUFACTURING COMPANY
OF KALAMAZOO
A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT
3020 NORTH BURDICK ST. amp KALAMAZOO, MICHIGAN

FACTORY / EQUIPMENT NEWS

Begins on page 108

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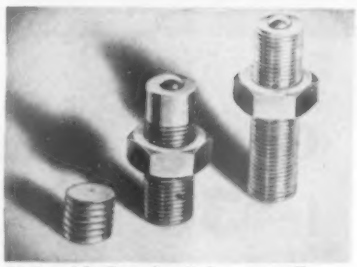
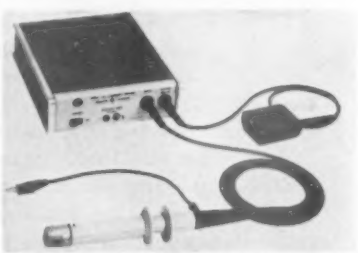


157—Air Jets for "air-stream" conveying of packages, are corrosion-proof, have no-catch surface, no moving parts. Three styles for high (12 to 30 lb.) or low (to 7 lb.) pressure systems. Loads to 500 lb. slide freely. Self-cleaning. *Paper Equipment Distributing Co.*

158—Underfloor Duct System for electric wires adapts to new construction or modernization. Made of 14-gage steel in 1½x3- and 1½x6½-in. sizes. Has junction box units and component assembly parts; colored service fittings. *Wheatland Electric Products Co.*

159—Machine Load Calculator is circular slide rule that simplifies translation of production quantities and rates into shop loads. Easy to understand and use, it has no decimal points to worry about. Figures one or series of operations with one setting. *Van D. Mark.*



160—Clamp-On A-C Milliammeter enables you to measure current in circuits without opening connections. Small probe and amplifier converts milliamperes to millivolts for direct reading on any vacuum tube voltmeter. Range 1 ma. to 1 amp.; $190. *Hewlett-Packard Co.*

Turn the page

A NEW HIGH...IN VALUE
A NEW LOOK...IN STYLING
A NEW LOW ...IN PRICE

AUTOMATIC'S Gas Operated LIFT TRUCKS

VALUE PLUS—Automatic's simplified power package offers the ultimate in high operating efficiency, low cost of operation, and maximum safety. A gas engine and variable voltage generator, precisely matched, supply exact power to the electric drive motor...no clutch or hydraulic torque converter to cause trouble or worries. Here are a few of Automatic's plus value features:

- Operates on 25 to 30% less fuel
- 50% longer hydraulic pump life
- Oversize brakes last up to 30% longer and are adjustable without removing wheels
- Longer-life, advanced-design roller mounted uprights
- Ventilated exhaust dispels fumes
- New 3-way adjustable seat increases driver efficiency—reduces fatigue

MODERN STYLING—New orange and blue color combination. Automatic's new special high visibility safety orange adds another safety plus feature to your plant, while its new royal blue color accentuates the truck's low center of gravity and high stability.

THE PRICE IS RIGHT—No longer a premium-priced truck, but priced competitively with trucks which use hydraulic torque converters.

CAPACITIES: ▲
3,000 to 10,000 lbs.
with cushion tires.

CAPACITIES: ▶
3,000 to 8,000 lbs.
with pneumatic tires.

AUTOMATIC®

AUTOMATIC TRANSPORTATION COMPANY
Division of The Yale & Towne Manufacturing Company
39 West 87th Street, Dept. MO, Chicago 20, Ill.

FIRST IN IMAGINATION
FIRST WITH REALITY

LEARN MORE ABOUT AUTOMATIC'S COST-CUTTING LIFT TRUCKS

Please send me complete details about Automatic Gas-Operated, Electric-Driven Lift Trucks, in capacities of_____lbs._____lbs._____lbs.

NAME_____
FIRM_____
ADDRESS_____
CITY & ZONE_____ STATE_____

DURANT

PRODUCTION Counters

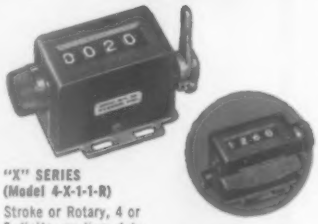
Durant production counters provide a careful, accurate check on all phases of industrial production, in the amount of materials being processed, and on the output of production machines throughout the plant. They are accurate and reliable instruments made for specific installations to operate at high speed and to withstand the impact of heavy industrial use for the longest possible life.

"H" SERIES (Model 5-H-1-1-R)
Heavy duty counter for long, dependable service. Available 5 or 6 digits and in stroke or rotary action.

"H" SERIES (Model 6-H-1-2-R)
Heavy duty stroke, 5 or 6 digits, features tumbler lock reset. Rotary models for speeds up to 2000 CPM.

A COUNTER FOR EVERY USE...

"SP" SERIES (Model 5-SP-7-1-R)
Small Predetermined Counter. When preset count is reached, signals or stops machine. Stroke or rotary.



"X" SERIES (Model 4-X-1-1-R)
Stroke or Rotary, 4 or 5 digits, medium duty. Small and compact. Model 4-X-2 — portable Desk or Bench Tally.

"CS" or "Y" ELECTRIC (Model 6-Y-1-MF)
Compact — speeds up to 1000 CPM. Panel or base mount on machine or at control center. "CS" larger figures, larger case size.

WIRE MEASURING AND LINEAL COUNTERS (Model L-25)
Also models for wood, paper, fabrics, and other lineal production.

Send for Catalog Number 200

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COUNTING INSTRUMENTS
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REPRESENTATIVES IN ALL PRINCIPAL CITIES

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.

161—Mobile Materials Tester that measures tensile, compression, transverse, and shear forces of metal, plastics, textiles, wire, etc. Calibrated pendulum in ounces, tenths of pounds or kilos, tests to ½ of 1% accuracy. Five ranges 0-10 to 0-300 lb. *W. C. Dillon & Co.*

162—"C-Flange" Gearmotor has separate motor and reducer connected by flange. One unit may be changed without scrapping the other. Reducer can be used with standard NEMA motor. Capacities from $\frac{1}{12}$ to 2 hp.; 5:1 to 60:1 speed ratios in increments of five. *Morse Chain Co.*

163—Flow-Sensitive Switch starts and stops electrical pumps, valves, alarms, or controls used in mixing, blending, etc. Monitors equipment and products for increase, decrease, reversing, or loss of flow. Fits lines from ¼ to 60 in. *Power Equipment & Engineering Co.*

Turn the page

20% LABOR SAVINGS ON HEATING AND VENTILATING WORK

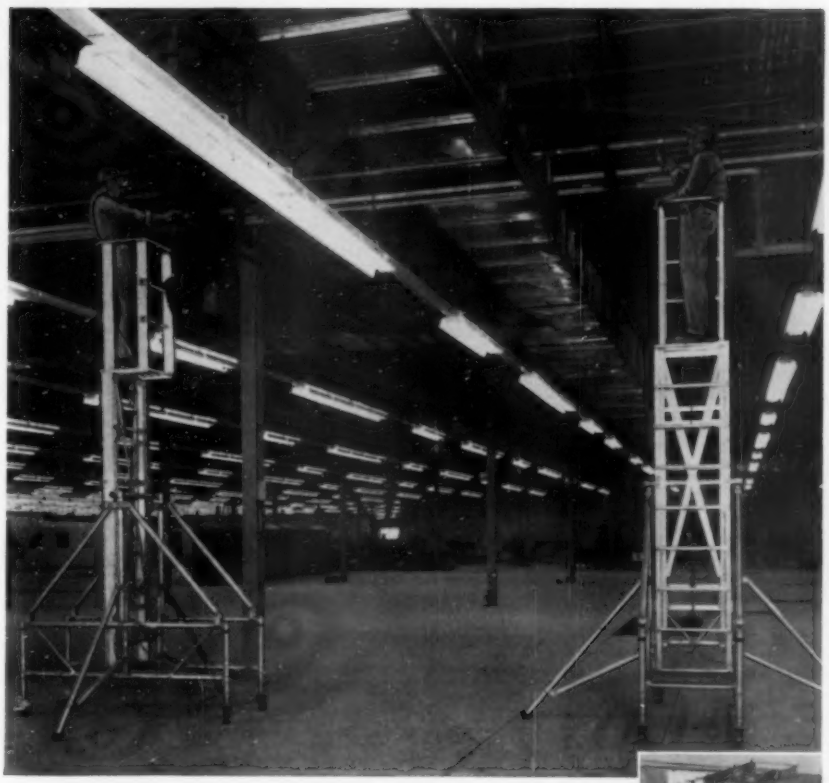
Up-Right aluminum scaffold-on-wheels gets men up in the air fast...lets them finish the job fast! Lightweight and quickly assembled without tools or loose parts, Up-Right scaffolds are adjustable to provide a safe, convenient working platform at any desired height. In 3 basic types for overhead installation and maintenance.

STAIRWAY TYPE

SPAN TYPE

TALLESCOPE

HERE'S HOW INDUSTRY SAVES ON OVERHEAD MAINTENANCE WITH NEW ALUMINUM SCAFFOLD



6 telescopic work platforms fold down to pass through doorways and under low ceilings saving repeated assembly and disassembly of conventional scaffolding that ordinarily wastes 20% of time in overhead work on heating and ventilating system. Western Electric Company plant, Kansas City, Missouri. Tallescope extends instantly for reaching heights up to 31 feet.

Write for descriptive circulars

UP-RIGHT SCAFFOLDS

DEPT. 178, 1013 PARDEE, BERKELEY, CALIFORNIA

In Canada: Up-Right Scaffolds, Ltd., 120 Russet Ave., Oshawa, Ontario

For more facts Circle 455 on Reader Service Card

Try a private automatic telephone system at NO EXPENSE!

See for yourself how the DuKane 10/1 telephone can give you instant information flow, better supervision, improved customer service, without adding to the load on your switchboard or tying up vital outside lines. Two to ten locations can dial each other for *private* talk. Voice paging for special areas. Rugged, fully automatic switchboard weighs only 11 pounds—fits anywhere in a jiffy. Beautiful desk or wall phones blend with any decor. Own for as little as **$304.50** or lease if you prefer. Demonstrated in your own office—no cost or obligation.

DuKane Corporation Dept. F 80
St. Charles, Illinois

Show how the DuKane 10/1 telephone system can help me.

Name_____

Company_____

Address_____

City, State_____

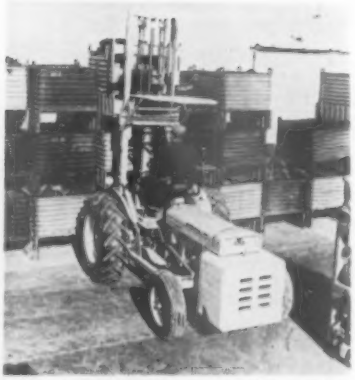
DuKane CORPORATION
ST. CHARLES, ILLINOIS

For more facts Circle 456 on Reader Service Card

FACTORY / EQUIPMENT NEWS

Begins on page 108

For more about these items, circle item numbers on Reader Service Card next to back cover.



164—Fork Truck travels forward or reverse with touch of operator's toe—no shifting or clutching. Close spotting of loads to 5000 lb. Standard mast lifts to 10 ft. at 24-in. centers; with extension it lifts 1500 lb. to 20 ft. at 15-in. centers. *Massey-Ferguson.*

165—Fluid Filter, for oil, coolant, and hydraulic lines, traps suspended solids and foreign particles to one micron. Compact, easy to install in small space, it filters up to 300 gph. Uses both natural and mechanical filtering elements. *Wire Cloth Products, Inc.*

166—Porcelain Valve, in aluminum jacket, withstands temperatures to 400 F. Unaffected by acids, except hydrofluoric; resists alkalis. Special washers prevent damage when tightening hand wheel. In ½- to 6-in. sizes; ratings from 50 to 100 psig. *Lapp Insulator Co.*

In a delivery to the U. S. Steel Gary works, the temperature of the grease was 25°F. Still, 22,860 lbs. of grease were pumped to the storage tanks in 65 minutes, with a pressure of 100 psi.

Cities Service Announces

REVOLUTIONARY CONCEPT IN BULK GREASE HANDLING

Until now the standard container for shipping and handling industrial greases has been the 400 lb. drum. For companies using large quantities of grease, these drums present such problems as: cost of storage and multiple handling—full and empty; up to 10% residuary waste; and the necessary cost of the drums themselves.

Cities Service, in cooperation with DuBois Engineering and Manufacturing Corp., recently embarked upon a program to develop a system for delivering grease in bulk from "the grease kettle to the bearing." The result is a tractor-trailer unit with two 12,000 lb. capacity containers. A gear-type pump on the truck transfers the entire load to the customer's stationary central storage containers in less than an hour. This system revolutionizes the concept of grease handling for companies using centralized systems.

The new Cities Service bulk-delivery truck is presently operating in the mid-west states with plans for expanding this service to other areas.

If you are a bulk grease user, the time and money this system can save you are well worth looking into. For the full story, call your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, 20 N. Wacker Drive, Chicago 6, Ill.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

Measurement / Control ideas for cutting costs:

HOW THESE REGULATORS AND VALVES SOLVED A COSTLY GAS CONTROL PROBLEM

The manager of a small pottery had run into trouble in his glazing department. The gas flames used for glazing were erratic. This resulted in slow production and far too much spoilage. He also had trouble maintaining controlled heat in the kilns.

A Rockwell Field Engineer quickly diagnosed the difficulties as resulting from faulty pressure regulation. He checked and found old, oversized regulators in use. Checking further he learned that, because of valve leakage, it was necessary to keep the meter shed door open in order to dissipate the fumes.

The Rockwell man recommended using modern Rockwell pressure regulators and Rockwell-Nordstrom valves. Correcting all his troubles cost the manager only about $800.00. Later he gratefully said these products quickly paid for themselves in spoilage reduction and gas savings.

As you can see, precise pressure control doesn't cost a fortune. It can save money in any plant where gas is being used in quantity. The same holds true of liquid measurement. Rockwell meters can measure almost anything that flows through a pipe. They provide you with accurate records that will cut your costs, improve your end products or do both.

Rockwell as the world's largest single manufacturer of meters, regulators and lubricated valves, has a world of experience upon which you can rely. Why not have a Rockwell Field Engineer survey your plant to explore new approaches to cost cutting through measurement and control. There's absolutely no obligation, so send the coupon today.

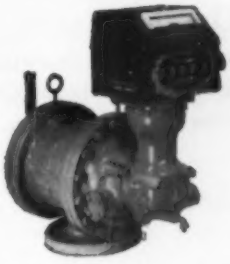
ROCKWELL

The leading single source for Measurement / Control products and ideas

For more facts Circle 458 on Reader Service Card

"IN-PLANT" METERING:

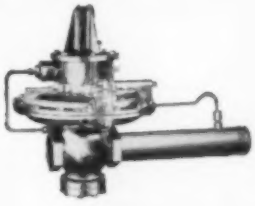
LIQUIDS AND GASES

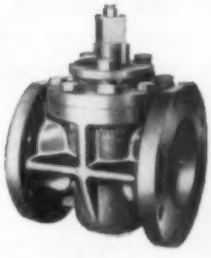


Rockwell gas and liquid meters, properly applied, can improve quality control, sharpen cost control, and prevent waste in almost every plant department. A Rockwell Field Engineer can help you find *where* meters will cut costs . . . and Rockwell has a complete line of meters to measure practically anything that will flow through pipe.

CONTROLLING PIPED MATERIAL:

LIQUIDS AND GASES





More efficient control of all the material flowing through pipes in your plant is a positive step in cutting costs. There are new applications and new ideas for using gas pressure regulators and valves that will stop wasteful, inefficient, and dangerous handling of fuels, production fluids, and products. A Rockwell Field Engineer can show you *where* and *how*.

HOW MUCH COULD YOU SAVE?

There is hardly a plant of any kind—including yours—where the right application of the right measurement and control methods and equipment won't produce savings many times the modest cost involved. It will cost you nothing to have a Rockwell Field Engineer *show* you. Simply send the coupon below, now.

SEND COUPON NOW!

MEASUREMENT AND CONTROL DEVICES

all fine products by

ROCKWELL

Rockwell Manufacturing Company, Dept. MC1H, Pittsburgh 8, Pa.

☐ Please have a Rockwell Field Engineer call me for an appointment.

Please send literature on ☐ Controlling gas pressures; ☐ Valving gases, liquids and slurries; ☐ Measuring liquids; ☐ Measuring gases.

I am concerned primarily with ☐ Light & Heavy Metal Fabricating ☐ Basic Chemical Production ☐ Chemical Processing ☐ Food, Drugs & Tobacco ☐ General Manufacturing Operations ☐ Petroleum Processing

☐ Others: _____

Name: _____ Title: _____

Company: _____

Address: _____

City: _____ Zone: _____ State: _____

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor, FACTORY

(For more information, circle item numbers on Reader Service Card next to back cover)

Baffled by computerese? You, too, can learn to talk the technical jargon of the computer boys—with an assist from this dictionary *(Honeywell)* designed to make industry's newest language intelligible to laymen. **(236)**

Dry lube sticks of molybdenum disulfide *(Alpha-Molykote)* impart lubricating film to cutting or shaping tools—or wherever metallic dry friction occurs on sliding surfaces. Also on small surfaces where oil can't be used because of contamination, temperature restrictions, etc. **(237)**

Planning for Better Maintenance is new data sheet *(Puritan Chemical)* loaded with suggestions for better plant housekeeping. **(238)**

Like to slice? Through 30 in. of metal in a single pass, that is? Can do with new natural gas cutting torch *(Linde)*. Good for any manual job in shop. Gas flow: up to 3000 cfh. of oxygen, 250 cfh. of natural gas. **(239)**

Booklet of the Month takes you smack into Buck Rogers territory, describes space-age InFab (inert fabrication) facility *(Universal Cyclops)* designed for manufacture of high-integrity mill products of ultra-high temperature metals such as molybdenum, columbium, tantalum, tungsten. **(240)**

Oh, my aching back will never be said by the groundskeeper whose boss bought him one of those canes *(Stick'n pick)* with sharp point for sticking papers, spring-action finger for picking up bottles, cans, etc., etc. **(241)**

Fire Prevention Week begins Oct. 9. Better start thinking today about educational materials *(NFPA)*. For example, poster that reads "Don't Give Fire a Place to Start," phone sticker for emergency numbers, folders asking "Can You Get Out?" and on "Fire Prevention for Your Home Workshop." **(242)**

With a couple of multi-purpose ratchet-lift trucks *(Di-Pelco)*, heavy, hard-to-handle loads glide along safely, inches from floor. **(243)**

In the market for an ambulance? Suggest you look at new one *(Siebert)* on Ford or station wagon body. Room for three patients and attendant. Swing-out door takes stress off body frame, stays put when open. **(244)**

Newest two-way miniature radio *(Globe Electronics)*, aptly named Pocketphone, operates at distances up to 1 mile on Citizens' Broadcast band. **(245)**

One way to schlitz air-conditioning loads and cut blinding glare of noonday sun: Install aluminum solar canopies *(Brisk)*. Stationary or operable louvers. For cantilever installation. Project as much as 5 ft. **(246)**

Flexi-Barrel is new 50-gal. material-handling container *(National Industrial Products)* molded from single piece of polyethylene. Has flexible walls, but is kept rigid by concealed steel hoop in rim. **(247)**

Programed manipulation is newest twist in automatic handling. It's a system *(General Mills)* by which remotely controlled power manipulators ("mechanical arms") are directed by analog controller functioning as an "electric cam" to perform repetitive, difficult, or hazardous jobs. **(248)**

Ton-Toter is whopping big lifting magnet *(Bux Magnetic Products)* of 3000-lb. capacity. Self-contained. No power lines. No batteries. **(249)**

Workers who use striking tools (chisels, star drills, punches) will thank you for toolholder *(Rose)* with 6-in. shock-absorbing, non-slip grip which keeps hands out of striking area. Handles tools up to 1¼ in. **(250)**

You can save a lot of hot water by installing metering showers *(Speakman)* with key-operated volume control. With easy-push handle, shower delivers up to 4½ gpm. of water, shuts off automatically. **(251)**

With automatic standby power unit *(ATR)* you're back in business 1/20th of a second after power line failure. **(252)**

Thermogarb is asbestos clothing *(American Optical)* that sheds molten metal at 3000 F. without deterioration or loss of resiliency. A 30-in. coat weighs 3¾ lb. compared with usual 6½ lb. **(253)**

Optical leveling kit *(Keuffel & Esser)* gives quick readings to 0.001 inch—no lines to be stretched, no spirit levels, straight edges, gages, indicators, etc. Simplifies foundation and bedplate leveling, differential leveling, profiling, checking movement or settling of heavy equipment. **(254)**

Safety switch *(CRS Industries)* is for access doors to plenums in air conditioning systems. To get in, man has to unscrew wing nut, thereby interrupting primary power (no resumption of power should door blow shut). **(255)**

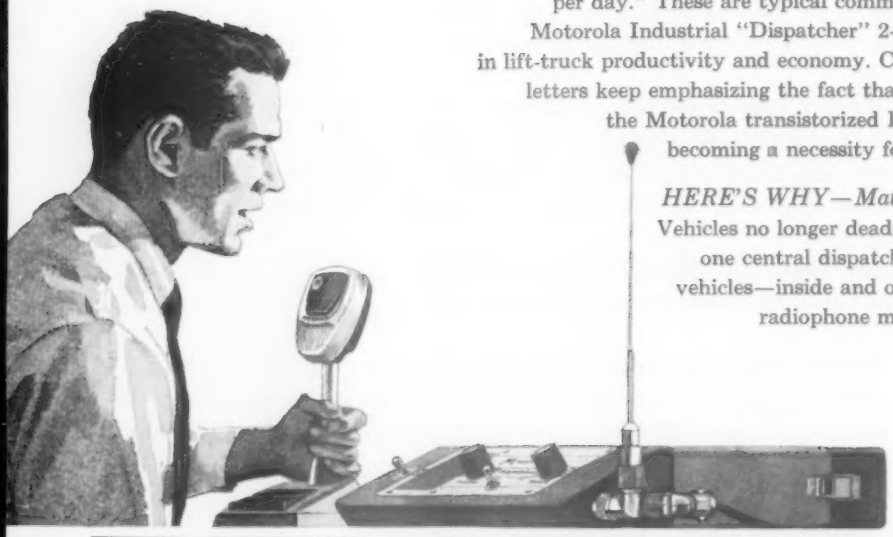
What do you mean, Strubing? is title of 8-page brochure *(Wolverine Tube)*. Seems Strubing (a combination of *strip* and *tubing*) is new seamless tube product that can be shipped in flat-coiled strips, then expanded to usable form by applying pressure and simply blowing it up to size. **(256)**

Thing we like about Com-fit ear plugs *(Sigma)* is they're made of silicone rubber with triple flange that completely seals off ear canal. **(257)**

Turn the page

SAVE TIME SAVE MONEY

2-way radio . . . indispensable tool for increasing the efficiency of materials handling operations



HERE'S PROOF—"Almost 100% truck efficiency" . . . "3 now do the work of 5" . . . "2 hours more production per truck, per day." These are typical comments from companies where the new Motorola Industrial "Dispatcher" 2-way radio is turning in new records in lift-truck productivity and economy. Careful surveys as well as unsolicited letters keep emphasizing the fact that, in the field of materials handling, the Motorola transistorized Industrial "Dispatcher" radio is fast becoming a necessity for firms who must stay competitive.

HERE'S WHY—Materials now move according to plan. Vehicles no longer deadhead and backtrack. Motorola links one central dispatcher with all your materials handling vehicles—inside and outside. The Motorola "Dispatcher" radiophone mounts easily on any vehicle; it's the

---

IDEAS OF THE MONTH . . . *Begins on page 150*

(For more information, circle item numbers on Reader Service Card next to back cover)

Got training troubles? Might pay you to look into Autotutor. Automatic teaching machine *(Western Design)* makes student active participant in learning process instead of passive recipient of information. **(258)**

No coffee break problem in smaller shop or office equipped with Buffet Queen. New automatic percolator *(Cory)* makes 10 cups in 12 min., 40 cups (top capacity) in 35 min. Mild, medium, or strong. **(259)**

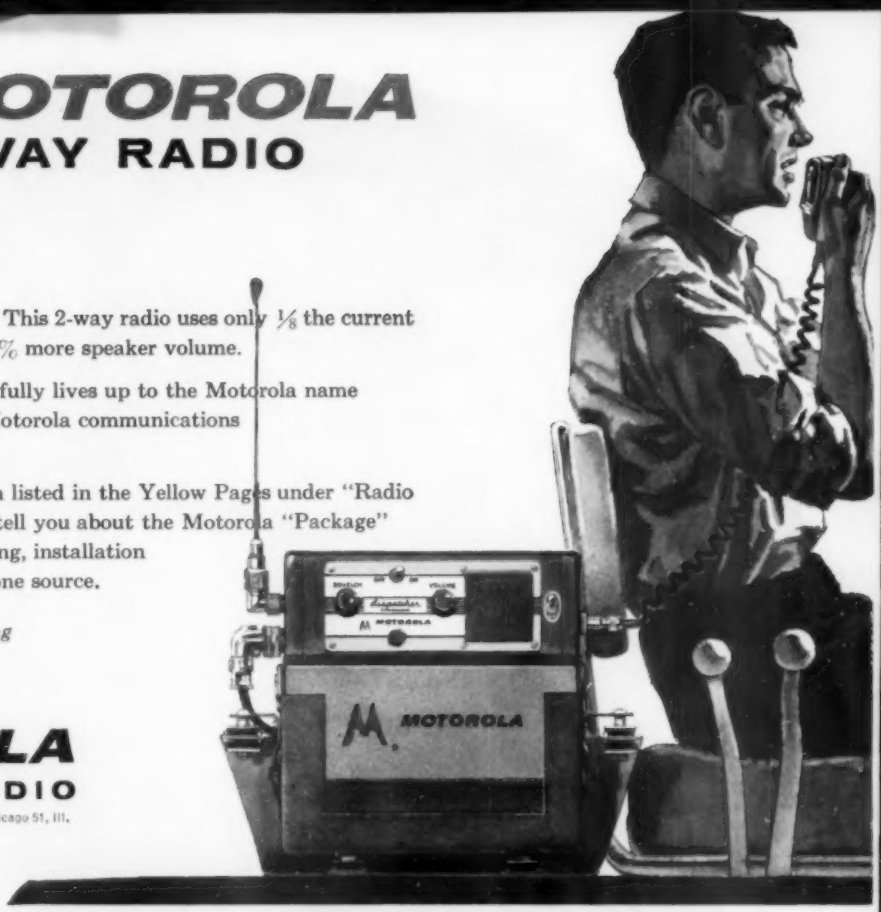
If you live in or near NYC—or will be there Sept. 9 or 10—why not take in Vend-O-Rama *(LaTouraine Coffee)* where a dozen vending machine companies will demonstrate fine art of one-cup-at-a-time brewing. **(260)**

Even the tiniest compressed gas leak shows up as bubble when suspected pipe joint is daubed with new leak detector *(Calgon)*. **(261)**

What do steel bars weigh? You'll find answers in 72-page booklet *(Dyson)*. Round, square, hexagonal, octagonal bars. Flat ones, too. **(262)**

You're hard to please if you don't find the safety work gloves you need in newest catalog *(Advance)* to land on our desk. **(263)**

WITH MOTOROLA 2-WAY RADIO



smallest industrial radio available today. This 2-way radio uses only 1/8 the current required by other radios, yet delivers 50% more speaker volume.

The Motorola "Dispatcher" radiophone fully lives up to the Motorola name for dependability. Industry uses more Motorola communications systems than all makes combined.

Call your Motorola man. You'll find him listed in the Yellow Pages under "Radio Communications Equipment." Let him tell you about the Motorola "Package" —how your systems engineering, financing, installation and maintenance, can be handled from one source.

Write today for your free Materials Handling 2-Way Radio Fact Kit.

"Dispatcher" is a trademark of Motorola Inc.

MOTOROLA 2-WAY RADIO

Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 51, Ill.
A Subsidiary of Motorola Inc. SPaulding 2-6500

Circle 459 on Reader Service Card

Sealzit is new spray-gun method *(Flintkote)* of applying roofing in one time-saving operation. Gun has three nozzles—one for chopped glass fibers, two for coatings. Glass fibers may be combined with other aggregates—crushed rock, vermiculite, sand, metallic powders, decorative flakes, etc. **(264)**

For quick inspection of small objects, there's a new 3x illuminated magnifier *(Bausch & Lomb)* with wide field of view. **(265)**

No burrs, no seams, no sharp corners on Plastiboxes *(Lewis)*. They're plastic stacking boxes for small parts storage (with transparent dust covers, if you like). Or, mounted on special rails and supports, they're ideal for bench assembly work. Green or yellow. Four convenient sizes. **(266)**

Maintenance men ought to like this Select-O-Lock adjustable wrench *(Utica Drop Forge)* with a gimmick that locks it at any setting just with a flick o' the thumb. No slipping. No resetting. **(267)**

Before you buy safety shoes, see new selector guide *(Goodrich)* with "relative resistance ratings chart" that enables you to pick the footwear that's right for the specific working conditions in your plant. **(268)**

M V T R/MAKES THE VITAL DIFFERENCE.... Moisture loss (or moisture gain) are vital factors in the food packaging business. Moisture loss results in less than full weight as marked on the package. Also, it makes the food unappetizing to the consumer. Moisture gain, on the other hand, makes for sogginess and loss of flavor. CCA Research and Development Laboratories know their MVTR—Moisture Vapor Transfer Rate. Build the proper moisture barrier into your package. To pack it—move it—sell it is the business of CCA packaging.

CONTAINER CORPORATION OF AMERICA

CCA

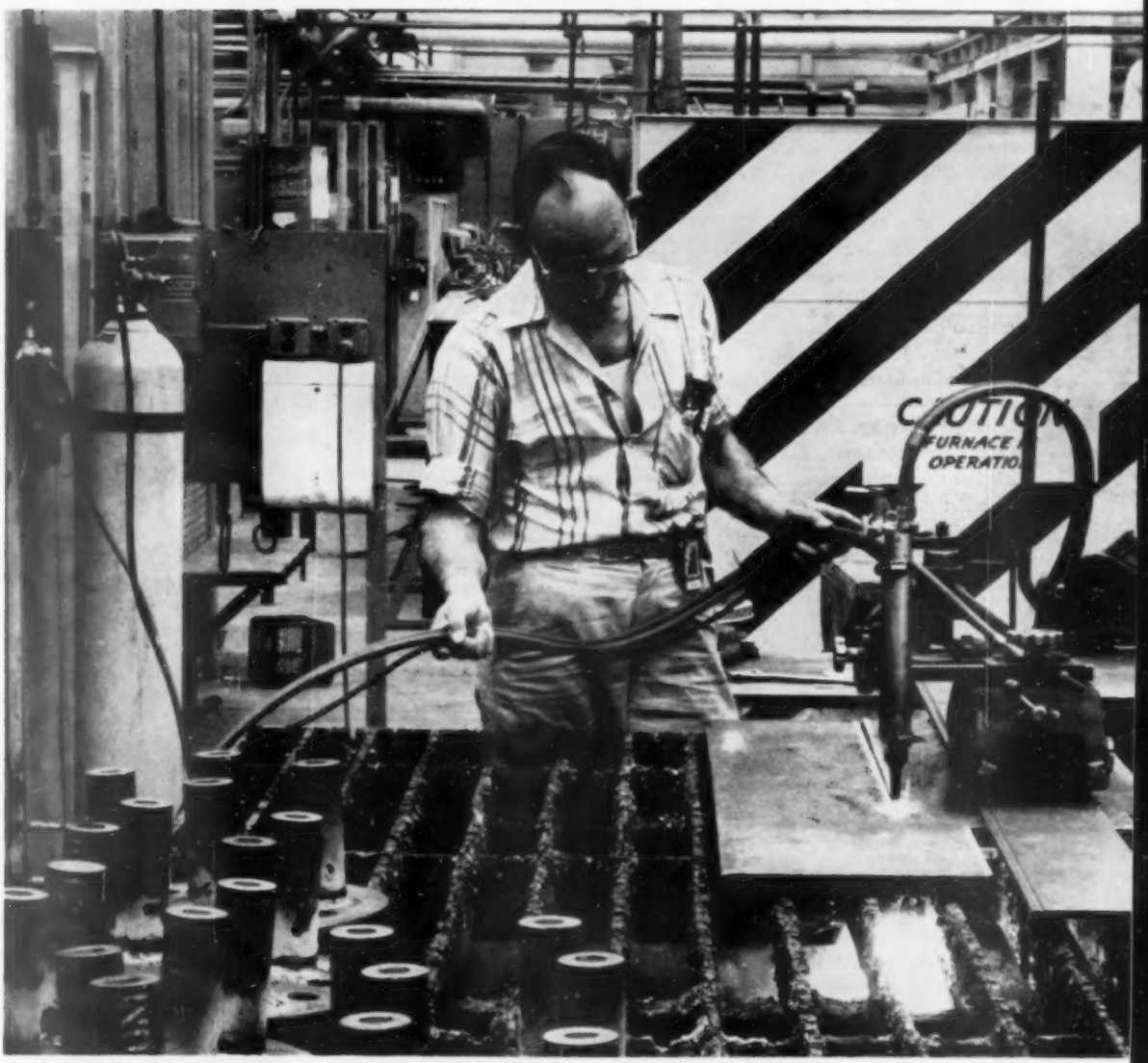
Chicago 3 . . . and all key marketing areas

Folding Cartons **Shipping Containers** **Sefton Fibre Cans** **Molded Plastic Products** **Point-of-Purchase Displays** **Paperboard**

For more facts Circle 460 on Reader Service Card

FACTORY

PLANT OPERATIONS
CASE BOOK



CUTTING WITH GAS Using natural gas instead of acetylene for cutting knocks 70% off fuel cost at Lockheed. The tank at the left is for oxygen, and just beside the tank is a hydraulic back-up valve—installed as a safety measure. Gas from the plant's regular line is used . . . page 157

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NORMAN H. SOLON, EDITOR

No. 34 August 1960

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Giant crane moves metal tubing fast

There's no problem to handling heavy metal tubing at Tubesales Company, Los Angeles. This mammoth crane can haul up to 3 tons of material while traveling on three runways, each 430 feet long.

The crane (Jervis B. Webb Company, Los Angeles) moves laterally from the runways into the racks on an auxiliary trolley. And the cab and fork lift can rotate 360 degrees while lifting or lowering.

The fork operates at two speeds (12 and 35 fpm.) and lifts from floor position to about 4 feet. At that height it connects with the operator cab, and both lift simultaneously. This allows the operator to see his load at all times.

There's no danger of a tipover when the fork picks up the load because the auxiliary trolley is equipped with a limiting device. This means that when the fork is maneuvered for loading, it can go no further than 25 inches into the rack, thus preventing an overbalance in weight. Forks can be tilted 5 degrees either way from horizontal.

The auxiliary trolley has a rotating speed of 1 rpm. and a travel speed of 100 fpm. It has fluid drive with automatic acceleration.

All crane operations and movements are controlled by one man working six levers in the cab control panel. (The extra-long load in this photo, however, required two men.) The crane saves floor space, since it requires aisles of only 5 feet. And it increases material-handling flexibility and speed.

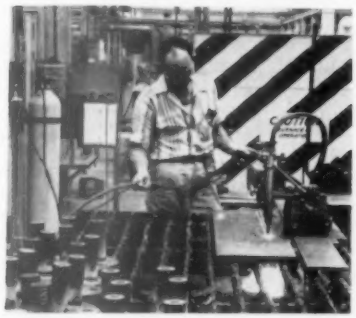
Mixer separates grit from chain

Here's one way of getting scale, rust, and dirt off a scaffolding chain. It's used at Kaiser Aluminum & Chemical Corporation's Baton Rouge, La., aluminum works.

The chain is tumbled in a concrete mixture with a small amount of water. The tumbling action descales the chain links. This permits closer inspection for breaks and damage, and makes the chain much easier to handle.

(Cover story)

Cutting with natural gas



Substituting natural gas for acetylene has reduced fuel costs in steel burning operations by 70% at Lockheed Aircraft Company's Marietta, Ga., plant.

A cutting torch (Harris Calorific Company, Cleveland) is connected to the plant's regular natural gas line. The natural gas is mixed with oxygen from a nearby tank, and the combination supplies pressures ranging from 5 ounces to 4 pounds per square inch.

The cutting torch is mounted in a cutter line (Victor Equipment Company, San Francisco). This assures precision parallel or cylindrical cuts on all sizes of stock.

To guard against surges of flares during the cutting operation, the company installed a hydraulic back-up valve on the gas line.

Plant engineers estimate that 1000 cubic feet of acetylene are used each month. Cost comparisons for acetylene and natural gas show that expenses will be less than one-third under the new system.

The changeover has also eliminated acetylene tank handling and storage. And cleaner cutting has cut down on machining.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

THESE RAILS WILL MOVE OUT OF THE WAY

Mezzanine storage racks combine convenience with safety at U. S. Gauge Division of American Machine & Metals, Inc., Sellersville, Pa. The steel railings are easily removed. There are no steps or ladders to climb to haul down materials or take them back—it's all done by fork truck. System saves plenty of time during inventory. The fork truck carries a scale on a rack and weighing is done on the spot. Storage rack is made by Standard Pressed Steel Company, Jenkintown, Pa.

Quality control with three dimensions

There are three dimensions to quality control at Graflex Inc. (Rochester, N.Y.), subsidiary of General Precision Equipment. A stereoscopic microscope gives the operator a 3-D view of flaws in materials. And a stereo Graflex camera actually films problems and solutions without a special set-up.

The system works in three steps:

1. Adjust the microscope to bring the specimen into sharp focus.

2. Swing the camera into position over the eyepieces. Specially designed compensating prisms in the adapter make the camera parfocal with the microscope's optical system.

3. Snap the picture with a cable release.

Illumination for the photography is provided by a self-contained fluorescent light package which clamps to the objective of the microscope. The lighting is corrected for color photography.

To compensate for differences between the right and left eyes, the left eyepiece in the microscope tube is equipped with a spiral focus collar. After the operator gets the best focus with his right eye, he shifts that eye to the left tube. This makes sure that the focus will be the same as for the right eyepiece. The camera thus sees the object similarly through each lens.

ELECTROSTATIC PAINTING UPS OUTPUT 8 TIMES

Replacing two air hand-spray guns with two electrostatic hand guns has increased production volume 700% at Afco Aluminum Manufacturing Company, Inc., Miami. The company used to paint only about 100 items a day. Now it paints 800 a day. Economywise, there's 75% less waste with the new system. And clean-up time is a fraction of what it used to be. All areas of an item are painted with one pass of the gun from one side. Afco paints 125 different-size parts. Some of the smaller pieces are grouped—as many as 28—on one work holder. The electrostatic guns are made by Ransburg Electro-Coating Corporation, Indianapolis.

New lease on life for tired batteries

Simple items like flashlight batteries were costing management more than $200 a month at Lockheed Aircraft Company's Atlanta, Ga., plant. Seems that employees were in the habit of requisitioning and using them for personal reasons.

To cut down on this excessive usage, management now requires employees to turn in a burned-out battery for each new one issued. This has reduced pilferage to a minimum.

Half the batteries turned in to tool cribs prove ready for a new lease on life. They're recharged on a large board with 16 frames, each holding 12 batteries. The 192 batteries stay on the board for eight hours, receiving a constant charge of 225 milliamperes from a 110-volt line. At the end of the charge period each battery is tested (photo) to see whether it has enough charge to be returned to service. Some cells dated 1954 are still proving rechargeable.

Payoff: a 30% reduction in battery usage.

Lightweight oven hangs on ceiling

This electric infra-red oven is suspended from the ceiling, right on the production line, at Emerson Electric Manufacturing Company, East St. Louis, Ill. All parts, regardless of size, can be dried in just 2½ minutes.

Formerly, parts at Emerson were racked and baked in an electric batch oven for 20 to 30 minutes. This meant excessive material-handling costs, tied up valuable space.

Both zones of the new oven have positive temperature control. By turning a knob on a cyclical timer, the temperature can be brought to any point from 0 to 100% of rated power and held to a tolerance of less than 1 degree. Since the oven can always register the desired heat at the right time, there's no need to change either conveyor speed or baking distance.

The oven was manufactured by the Dry Clime Lamp Corporation, Greensburg, Ind.

High production with tiny tolerance

Meeting high production requirements for varying sizes of extremely high accuracy templates and contour parts is no longer a problem at U. S. Army's Pantex Ordnance plant, Amarillo, Tex. A numerically controlled precision-contour, boring, and template grinding machine now does the job.

This specially made machine (Heald Machine Company, Worcester, Mass.) permits grinding or machining to a tolerance of plus or minus 0.0001 inch in routine production of templates and parts. It's controlled by a two-axis numerical system (made by Bendix Corporation, Detroit).

Accurate control of temperature is essential to maintain the high efficiency of the machine. At the Amarillo plant it's installed in a room with a constant temperature of 75 F.—doesn't vary more than one-quarter of one degree.

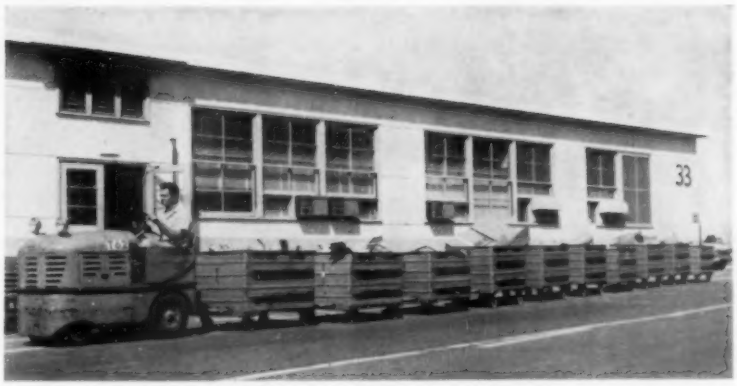
Teaser questions aid communications

They're stealing a page from a movie press agent's book at Stokes Molded Products Company, Trenton, N. J. Teaser bits on all bulletin boards are putting management's message over dramatically.

For example, it posted a question, "Who cares what it costs?," all over the plant. After a week the answer was given where no employee could possibly overlook it—in his pay envelope. Printed on a colorful slip of paper, it read:

"The customer who pays for it certainly cares what it costs—and if our price is too high, it's no sale for us. Let's not kid ourselves that a penny here or there isn't important. Every cent we can save without reducing the value we deliver is the means to more business and job security. All of us ought to care about costs."

Subjects such as scrap control, cost control, and quality consciousness are covered in these messages. Material comes from Personnel Materials Company, Geneva, Ill.



LONG CHOO-CHOO TO CLEANLINESS

These trash cans on wheels are saving 50% on manpower and equipment needed for refuse removal at Convair (San Diego, Calif.), a division of General Dynamics Corporation. Before the trash train system was instituted, refuse traveled in metal tubs via fork-lift trucks from manufacturing buildings to central outside accumulation areas. From here the tubs were loaded onto flat trailers by fork lift and towed to the reclamation yard. Now these mobile trash cans are placed in main aisles in production areas and are serviced periodically by the train. As one train picks up the refuse container, another unloads an empty can in its place.

Infra-red bonfires give plant comfort

Only the half of the building where employees normally work is heated at Junkin Safety Appliance Company, Louisville, Ky. No money is thrown down the drain in unnecessary heating costs.

Gas-fired infra-red generators do the trick. They're placed overhead, warming the floor, tools, materials, and personnel below. As a result, the company maintains comfortable working conditions even with the constant air movement between heated and cold areas.

The plant formerly used two forced air-space heaters with a total 185,000-Btu./hr. input—one on each side of the building. But they didn't provide sufficient heat.

Now seven infra-red heating units (Perfection Industries, division of Hupp Corporation, Cleveland), in a straight line, radiate over a 25x85-ft. area. The units are rated at only a total 168,000-Btu./hr. However, this lower rating is sufficient to maintain a thermostat temperature of 70 degrees, until the outside temperature sinks a few degrees below freezing.

In colder weather, working conditions are still comfortable because of the radiation. This is comparable to a man standing near a bonfire in frigid weather. He is warmed by radiation even though the air remains cold.

SEPTEMBER CASE BOOK

The aggressive management team at Athenia Steel is no accident. Testing, training, and extreme selectivity in hiring during a five-year transition period is paying off for this well-run plant.

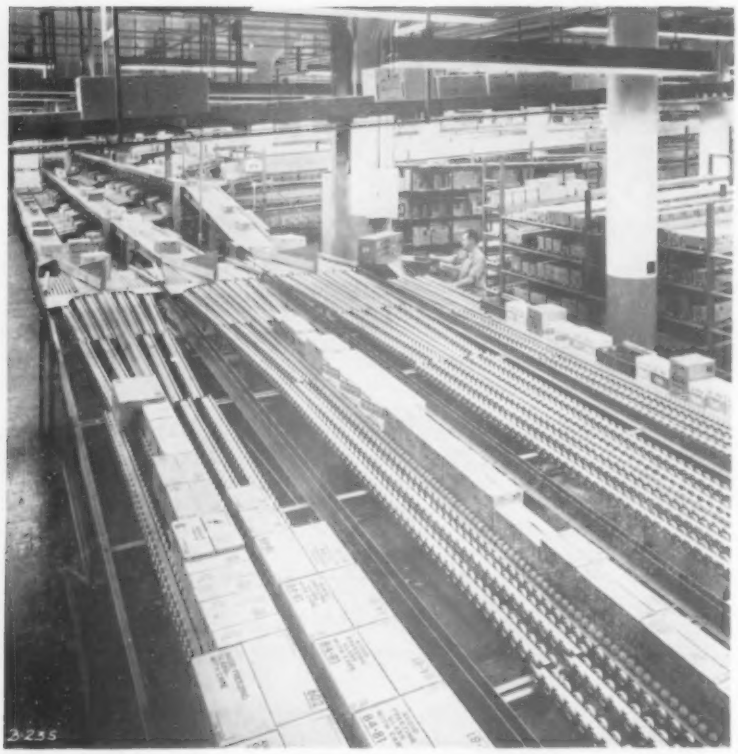
Bin takes load off workers' backs

One man handles this dumping operation at Nestle Company's Marysville, Ohio, plant. And there's no manual labor involved. It's all done with a hook-and-tilt system (Tote System, Inc., Beatrice, Neb.).

The Tote Bin, which holds some 1200 pounds of dried milk, is designed for fork-truck lifting. It's carried to the tilting station by fork truck, and inclined at a 45-deg. angle for full flow-out of the contents. When empty, it returns to storage.

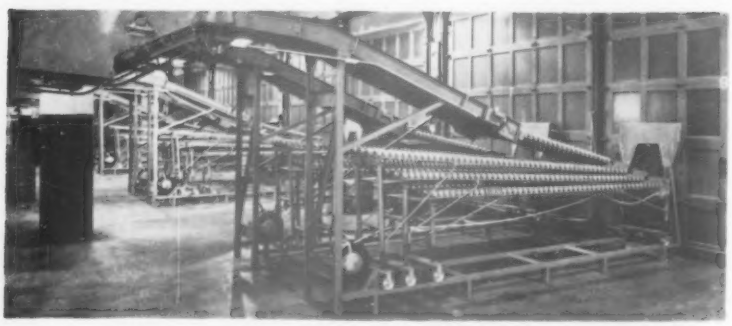
In the past, 200-lb. capacity barrels and 18,000-lb. tanks did the job. However, it took three men to dump the barrels and special conveyor equipment to move and dump the tanks.

STORAGE TO DOCK— All by electricity



Feed a card into the machine and . . .

Order is picked up automatically . . .



Then delivered by conveyor to dock.

Punch a machine and the items you want are on their way to the shipping dock. It's just that simple at Colgate-Palmolive Company's Kansas City, Kan., distribution center.

The 72 most active items in the giant warehouse are controlled by an automatic electronic director and control system (General Electric Company, Schenectady, N.Y.). The system can read, sort, and memorize 100 cards per minute. This averages out to 10 seconds an order.

A set of punched cards is prepared for each order. Each card may call for between one to 99 cases of a particular item. An end-of-order card closes out each sequence. The operator places the cards into the electronic reader and his work is finished. From that point on it's all automatic.

Items are stored in a giant flow storage rack. Gravity conveyor lanes are arranged in three decks of 24 lanes each.

The control system directs the discharge of cartons onto one of three moving conveyor belts that traverse the face of the rack at three different levels. At the end of each belt are deflectors that are set for either right or left. In this way each belt empties alternately into one of two conveyor lanes to accumulate an order. This speeds up operations by allowing a second order to be started while the first is still being processed. All conveyor lanes merge into a single-lane conveyor, which then distributes orders to one of six branch-line conveyors leading to the shipping dock.

A coded tote box that leads the cartons of each order automatically directs the deflectors.

This Auto-Pick system was designed and built by Alvey-Ferguson Company, Cincinnati. It's faster and more accurate than manual order picking. It also permits closer control of inventories and assures safe handling of items.

This safety award is "really big"

Workers have been extra safety-conscious during the past three months at Union Bag-Camp Paper Corporation's Savannah, Ga., plant. They couldn't afford not to be. The payoff was too big.

The company sponsored a safety contest that closed last month with a Falcon automobile as the top prize. All hourly employees were eligible. To qualify, they had to meet the following four conditions:

1. Have a perfect safety record from the start of the contest (May 1).
2. Be able to quote the current weekly safety slogan on the departmental and safety bulletin boards.
3. Be wearing safety shoes.
4. Be using proper safety equipment when inspected on the job.

Names were drawn at random by safety committees every week and winners were inspected by committee men. Weekly winners received cigarette lighters, had their names placed in a barrel for the final drawing.

As a continual reminder, the car was parked at the plant bus stop throughout the contest.

FLUORESCENT LIGHTS ARE ESKIMOS

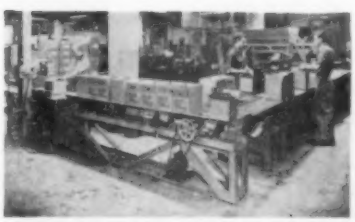
Arctic-like temperatures don't affect the efficiency of fluorescent lamps in the freezing room at Seaway Wholesale Grocery Company, Cleveland. A new outdoor glass-jacketed lamp made by General Electric Company (Schenectady, N. Y.) can withstand below-zero temperatures. The new system provides five to six times as much light as the incandescent bulbs formerly used, with only a 25% increase in electric power. The fluorescent lights also benefit the cold-storage operation because they reflect less heat in the warehouse than the incandescent lamps.

Wheels fight fire

Fire is always a danger in any plant —especially in a pharmaceutical operation that covers 100 acres and 44 buildings. But at Hoffmann-La Roche, Inc., Nutley, N. J., a company-owned fire engine built to specification by Trautweins, Inc., can handle most emergencies.

Hoffmann's engine has a 250-gal. self-contained water supply, 30 gallons of foam, four 20-lb. carbon dioxide and four 30-lb. dry chemical portable fire extinguishers.

If a fire occurs in an inaccessible area, a fireman has only to push out the pack rail of the truck to convert it into a ramp (photo). Then it's an easy matter to roll two 200-lb. wheeled dry chemical units (Walter Kidde & Company, Inc., Belleville, N. J.) out of the trucks onto the ramps. Each unit is equipped with 100 feet of hose.



Vibration fills boxes on conveyor

Heaping boxes of steel stampings, weighing from 30 to 50 pounds apiece, get more jogging on this conveyor line than a rush-hour strap-hanger does on the New York City subway.

United Carr Fastener Corporation, Cambridge, Mass., uses a vibrator that jogs the boxes while it conveys and stores them. The vibration settles the stampings, thus increasing the amount of material that can be packaged per container.

The 12-cu.-in. boxes get the jogging treatment twice as they travel along the conveyor line (Chain Belt Company, Milwaukee).

Cleaning by cavalry

By putting its janitorial service on wheels, SKF Industries, Inc., Philadelphia, cut one-third off its housekeeping costs in production areas.

With two gasoline-powered sweepers, supplemented by a hand scrubber, two men can now clean 13,500 square feet in one night. Formerly, an outside janitorial service handled the job—used up to seven men to clean the same area.

Both sweepers are fitted with an exhaust purifier (Oxy-Catalyst, Inc., Wayne, Pa.) which eliminates any possible fume hazard.

THESE BINS KEEP LIME UNDER COVER DURING HANDLING

There's no chance for moisture to get into lime during handling at Timken Roller Bearing Company's Canton, Ohio, plant.

Metal bins are used to transport the lime under cover from the lime plant to the charging boxes at the furnace melt shop. Each container is 38x40x80 inches, designed to hold just enough lime to fill three charging boxes. The containers fit 10 at a time on the flat bed of a truck. Four flared pedestals at the top of each one permit the containers to be stacked one on top of the other. They're filled at the lime plant by conveyor (left photo) through an opening in their tops. Each full load on the truck totals about 34,000 pounds. At the melt shop the bins are transferred to a fork truck and emptied—through a trap door in the side—into three charging boxes. The system also eliminates excess lime dust caused by extra handling.

Machine palletizer combats fatigue

Loading pallets is no longer a slow, wearisome operation at Abbott Laboratories, North Chicago. This automatic pallet loader (Lamson Corporation, Syracuse, N. Y.) is doing the job with ease.

Before installation of the pallet loader, five men were assigned to palletization. Now the job requires only two men—one of them a fork truck operator.

The machine can automatically count, space, rotate, and form each pallet layer to a predetermined pattern. Alternate layers are rotated 180 degrees to achieve an interlocking pattern.

Empty pallets are fed into the machine at the rate of one every other second. Seven case sizes can be handled, each with a different interlocking pattern and varying layer count. The loaded pallet is discharged onto a powered chain conveyor for fork-truck pick-up and delivery to the warehouse.

An electric-eye system is triggered to detect changes in the case sizes when a new product comes through the feed conveyor. It stops the machine automatically and signals the operator.

Controls nut torque

Driving nuts to just the desired tightness is no problem at Assembly Products, Inc., Chesterland, Ohio. It's done by measuring the amount of load on an electric motor as it drives the nut. Assembly developed the apparatus for its own use. Here's how the system works:

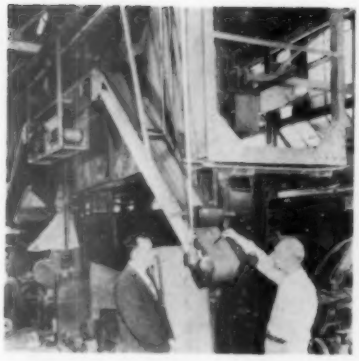
The load on d-c motors is measured electrically by a meter relay with two dials. One dial is an adjustable pointer that sets the limit of permissible current—the level at which the motor will drive a nut to the desired tightness. The second dial shows the actual amount of load that is being drawn while the nut is being tightened short of that limit. When the two dials meet they lock contacts and close a circuit that energizes a relay. This relay, in turn, shuts down the motor.

The shut-off point is determined by a trial-and-error method for each new item.

When a-c motors are used, a watt meter can substitute as the meter relay.

A safety device can be installed to prevent surges of starting current from being a problem.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices, write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.



Resin coat solves sticky problem

Hot rubber being transported on woven belting used to create a sticky problem at Dunlop Tire and Rubber Corporation, Buffalo. The rubber (at temperatures as high as 300 F.) frequently stuck to the conveyor belting. Each time this happened it cut off the supply of rubber to the tire department, which was forced to shut down. This caused downtime losses to the tune of $15,000 a year.

These losses have been eliminated by using an Emralon-coated belt (Globe Woven Belting Company, Inc., Buffalo). Emralon is a resin-bonded coating of tetrafluoroethylene developed by Acheson Colloids Company, Port Huron, Mich.

The new belt is slick and non-corrosive, allowing the hot rubber to flow easily over it. The belt also has applications in the baking, canning, food processing, and food packaging industries.

Crane operators cram for safety

Safety is not just a matter of chance to crane operators at Ryan Aeronautical Company. All prospective directors, riggers, and operators must pass an examination before qualifying for their jobs.

Applicants for these jobs are given a brochure to study for one week. They then report to the safety office to take a written test.

A grade of 80% is required to pass. If a candidate fails, he is given one more chance to take the test. If he fails again, he is eliminated. Successful applicants receive a laminated license authorizing them to operate cranes.

The test consists of three parts—multiple choice, true and false, and completion-type questions. Here are typical examples:

- True or false—Bent hooks may be re-used provided they are straightened and heat-treated by plant maintenance (false).
- Multiple choice—Where loads are to be carried above working personnel, the crane operator shall . . . (hold the load until all people leave the area).
- Completion—At the beginning of each shift, what two things should you do before operating the crane or hoist? (1. Run out the cable for inspection; 2. Without a load, check the limit switch.)

Source: H. E. Rawlings, Senior Safety Engineer, Ryan Aeronautical Company, San Diego, Calif.

Air gives parts a lift

A small elevator built into the surface of a work bench takes the fatigue out of production-line handling of heavy gas meters at Sprague Meter Company, Bridgeport, Conn.

Previously, workers had to lift the meter to an overhead conveyor and secure it to a pair of hooks that carried it through the paint spray booth. As the day wore on the men grew fatigued, found it difficult to secure the units safely.

A plant-made elevator installed into the work bench solved the problem. It's connected to an air cylinder vertically mounted beneath the bench.

A worker now has only to step on the pedal to charge the single acting cylinder with compressed air. The cylinder, in turn, lifts the bench top to a pre-set height. A flow control valve in the line between valve and cylinder regulates rate of rise. This leaves both hands of the worker free to secure the meter to the conveyor (photo). When he releases the pedal, the platform automatically retracts to become part of the bench top once again.

The air-control system is manufactured by A. Schrader's Son (New York), Division of Scovill Manufacturing Company.

LOW-COST IDEAS EASE IN-PLANT HANDLING

Inexpensive wooden devices are proving excellent time savers and are reducing parts damage at Boeing Airplane Company, Seattle. Previously, the company used wrapping and cardboard containers and separators for protective handling. The new system uses plywood peg boards, frames, boxes, and dividers. Photo, left to right, shows typical applications: Skid-mounted A-frame peg board holds accessory drive end caps; dowels hold drive gears; egg-crate box holds bearing retainers; and the metal bin with slotted dividers takes care of drive housings.

◀ 1. Before:
COUNTING BY FORMS

After:
COUNTING BY LIGHT ▶

Chopping minutes off jobs is a must for Parke, Davis & Company, Detroit, where expansion of production operations is almost continuous.

By installing simple as well as sophisticated machines, the plant has cut the time for many operations from hours to minutes. Below are four examples of . . .

Making every production minute count

1. Counting small capsules is a cinch with this electronic machine (Radio Corporation of America, New York). Formerly, an operator scooped capsules into a form honeycombed with holes. Each form held 2000 capsules. When the form was filled, a lever dumped the contents into a drum. By checking the number of times a form was filled, each operator was able to count 1.8-million capsules a day with varying degrees of accuracy.

The electronic machine can count some two-million capsules an hour to an accuracy of 3/10 of 1%. The capsules are dumped into a giant overhead hopper. The push of a button gravity-feeds them down 20 transparent slides into as many lighted holes. Each capsule is counted as it breaks the light beam. An automatic cut-off device stops the machine at any number desired.

2. An electronic robot (top photo, facing page) takes over the supervision of these tablet drying tumblers during after-duty hours. Before its installation, workers had to add the last batch of liquid coating to the pills one hour before quitting time to make sure the coat was dry before they left. Adequate spinning is essential to prevent the tablets from drying into one big mass.

Now tablet coaters can add liquid right up to quitting time with assurance that the pills will be properly dried. The timers can, for example, be set so the tumblers make one revolution every 10 minutes throughout the night. Any timing and revolution combination can be worked out with the watchdog.

3. A beam of light spots any foreign matter in ampoules (2-in.-long thin glass tubes). The machine (center photo) was jointly developed by Parke, Davis and RCA.

From a hopper, each ampoule travels down a chute into a platform where it is spun at high speed and stopped. While the liquid inside the glass container is still revolving, a light flashes through. A particle of foreign matter—regardless of its size—will break the beam, and the machine will automatically reject the ampoule.

Ten machines controlled by only one operator can inspect more than 32,000 ampoules during an 8-hour shift. Women inspectors perform the same operation visually at a rate of some 5000 ampoules per day, but with less accuracy.

4. Odd-shaped tablets are easily eliminated from the conveyor with this plant-made machine (bottom photo). Vibrators send the individual disks rolling on edge down five channels, formed by 10 parallel revolving steel cylinders. The cylinders are angled so that irregular disks—too thin, too thick, or warped—are separated from those that are acceptable. An estimated 3-million disks are run off daily. Previously, workers had to sort and eliminate the imperfect disks manually before the disks were packaged.

2. Robot baby sitter

3. Beam pinpoints dirt

4. Eliminating the oddballs

Colorful foremen are easy to find

There's no mistaking foremen at Simmons Company's Atlanta, Ga., plant when the weather turns cool. They're all decked out in green blazer jackets. Each blazer has the foreman's name in ¾-in. letters just above the left pocket.

The jacket is not meant to have any morale or prestige value for the 21 foremen at the plant. Its function is to make a foreman easy to find when he is out on the floor among the 50 to 150 employees under his supervision.

Foremen are required to wear the identification blazers in winter only since they're too hot for summer. No warm-weather version of the jacket has been adopted by the company as yet.

PACE program puts right worker on job

One of the biggest roadblocks to efficiency in industry is the assignment of workers to auxiliary functions. At least that's the attitude at Northrop Corporation's Norair Division (Hawthorne, Calif.). And its management is doing something about the problem.

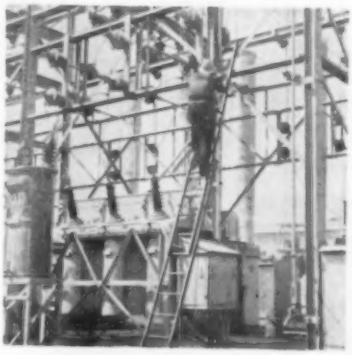
In any large plant, dual functions, indirect procedures, and distractions can mount up over the years without being noticed. On the lower and intermediate levels of supervision, the practices remain in force until they become standard operating procedure. But since they have no formal recognition they are never reported to the top.

To counter this trend, Norair set up a performance and cost evaluation program (PACE). Trained observers tour each work area many times a day. They assign an effort rating based on industrial standards to each group at each observation. They check on how many workers are out of their assigned areas and how many are idle. But no records are kept on individuals.

Group ratings are entered on charts weekly. If not satisfactory, the group's supervisor checks on weaknesses and investigates.

"Often the supervisor finds that a wasteful situation he himself has allowed to develop is causing the trouble," Norair's treasurer, J. Grant Macdonnell, reports. "One common mistake is to assign a valuable production worker to find a lost part, when a service unit is responsible for that function."

This program has forced supervision to find the problem and solve it. "Sometimes the problem is procedural," Mr. Macdonnell stated, "and other times it is due to the ineptitude of line supervision."



Silicone combats station flashovers

Use of silicone compound prevents power station flashovers and service interruption at Appalachian Power Company's Roanoke, Va., plant. And saves $2484 per year in maintenance labor and supply costs.

The plant kiln stacks deposit a film of cement dust that accumulates rapidly on station insulators. This creates a hard film that grows heavier until electrical leakage can follow the conducting path of the dust. A flashover with resultant damage is then a real threat.

To combat the hard film, insulators were coated with paraffin. High-pressure water washing was also tried. But all this met with only temporary success.

The problem was solved by treating the insulators with a silicone compound (Dow-Corning Corporation, Midland, Mich.). Electrical leakage and arcing have now been eliminated. The initial silicone application is expected to last for two years.

Source: W. W. Krebs, District Superintendent, Appalachian Power Company, Roanoke, Va.

YOU BE THE ARBITRATOR

THE CASE OF

The summer interlopers

Out of the experience of the American Arbitration Association

The contract between a union and a corn products refinery said that no new emloyees were to be hired while workers with seniority were on layoff. However, it had been management's practice to hire college boys for temporary work during the summer months, despite the fact some female employees were on layoff from their packing-room jobs. The plant manager always cleared this procedure with the union president and the latter never objected because it didn't seem likely that the women could do the kind of work the boys were hired for.

One summer, however, the temporary jobs were clean-up work and the union was convinced the regular female employees would qualify. So the union president refused to okay the deal. When the company hired some college boys anyway, the union filed a grievance.

The union rested its case on the contract clause. The company admitted the contract was clear on that point, but insisted the agreement had been superseded by past practice. "We're just doing what we've been doing for the past five years," the plant manager said. "The union can't object to it now."

"We let it pass on a year-to-year basis," the union retorted. "That's not the same as waiving our contractual rights forever."

Eventually the case went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 170

Portable sound booths

There's no need to remove items to a quiet room every time they have to be tested for sound at Royal McBee Corporation's Hartford, Conn., plant. Here they're tested right on the assembly line.

These plant-made portable tile-lined acoustical booths can be placed at any spot they're needed along the production line for quality control purposes. The inspector places the item to be tested inside the booth where the noise of the surrounding area doesn't penetrate. When he's finished, the booth can be manually carried to the next place where it's needed.

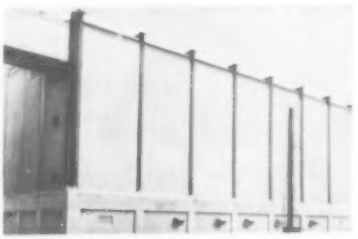
This booth provides greater flexibility for inspectors than the conventional sound room. And reduces material-handling costs.

Gravity eliminates 200-lb. carton push

Moving freshly packed cartons is a cinch at Timken Roller Bearing Company's Canton, Ohio, plant. The press of a pedal releases the stop on a gravity conveyor that leads to the main moving conveyor.

In the past, cartons were packed on small flat conveyors at each wrapping bench. Each packer had to push filled boxes (weighing about 200 pounds each) onto a moving conveyor under the storage bench.

Now two metal levers protruding above the conveyor hold the box in place while its being packed. When it's filled, the packer trips the pedal to depress the levers. This releases the carton, which rolls down the inclined gravity conveyor onto the main moving belt.



Plant is built to keep dirt outside

This General Mills Company plant in Buffalo, N.Y., was built with sanitation primarily in mind. Its walls are constructed of stainless steel panels with all the design details on the outside.

The interior looks like a solid sheet of metal on all sides, with no recesses, crevices, or horizontal structural members exposed to trap flour or other waste.

Construction was handled by The R. C. Mahon Company, Detroit.

CASE BOOK CAPSULES

Rotation of the earth has been measured by inertial means for the first time by Air Force engineers. The technique involves the accelerometer of the Atlas guidance system and a precise calibration centrifuge (American Bosch Arma Corp., Hempstead, N.Y.).

A $2-million computer center for education and research has been established at University of Southern California, Los Angeles.

Faulty construction of plants and lack of protective sprinkler and alarm systems are the main reasons that minor fires get out of control, reports the National Fire Protection Association, Boston.

An instrument that measures trace quantities of insoluble solids in liquids has been developed by Graver Water Conditioning Co., New York City.

Electrical power has been derived safely from tightly sealed pellets of a Strontium-90 compound by Martin Co., Baltimore, Md. The heat produced by normal radioactivity decay can be converted directly into 5 watts of energy.

Vehicles traveling on air, a fraction of an inch off the ground, may cut hours off inter-city travel in the near future. Ford Motor Co. is now experimenting with a model that will travel up to 500 mph.

A machine can read Russian print that's designed for electronic translation at the rate of 1000 characters per second. It was developed for the Air Force by Baird-Atomic, Inc., Cambridge, Mass. The machine can feed a translating computer 60 times faster than a typist can type the Russian text for conversion into tape for the computer.

American spacemen will orbit the planets Mars and Venus by 1970-71, predicted Krafft Ehricke, executive of Convair Astronautics, San Diego, at a recent meeting of the American Society of Mechanical Engineers, New York City.

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9.5	9.5	19	29	38	48	57	67	76	86	95	105	114	124	133	143
9	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135
8.5	8.5	17	26	34	43	51	60	68	77	85	94	102	111	119	128
8	8	16	24	32	40	48	56	64	72	80	88	96	104	112	120
7.5	7.5	15	23	30	38	45	53	60	68	75	83	90	98	105	113
7	7	14	21	28	35	42	49	56	63	70	77	84	91	98	105
6.5	6.5	13	20	26	33	39	46	52	59	65	72	78	85	91	98
6	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90
5.5	5.5	11	17	22	28	33	39	44	50	55	61	66	72	77	83
5	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
4.5	4.5	9	14	18	23	27	32	36	41	45	50	54	59	63	68
4	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60
3.5	3.5	7	11	14	18	21	25	28	32	35	39	42	46	49	53
3	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45
2.5	2.5	5	8	10	13	15	18	20	23	25	28	30	33	35	38
2	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
1.5	1.5	3	5	6	8	9	11	12	14	15	17	18	20	21	23
1	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
.5	.5	1	2	2	3	3	4	4	5	5	6	6	7	7	8
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Table finds footage figures fast

Plant layout engineers at General Electric Company's Phoenix plant make use of an old schoolboy aid—the multiplication table. It becomes an area calculating chart when printed to the proper scale.

With the chart (shown in use at top), the square footage of any rectangular-shaped area can be quickly determined. Part of a typical chart is reproduced in the lower photo. To calculate, you place the lower left-hand corner (arrow) of the chart at one corner of the area on the layout that you want to measure. Then you read off the square footage in the box directly over the diagonally opposite corner of the measured area.

G-E had its chart original designed to a convenient size and ruled by hand with area figures mounted in the spaces. A negative was made and prints were reproduced on 11x13-in. plastic film sheets scaled exactly to G-E's normal plant layout scales (¼ inch equals 1 foot, and so on).

G-E engineers used a company computer to run off the 3200 calculations involved. Figures on the computer print-out sheet were used to make up the chart original. This saved typing them out. However, the entire job can be done with a calculator and typewriter if a computer is not available.

Odd-shaped areas can be divided into right-angle triangles and measured with the chart, dividing the area figure in half.

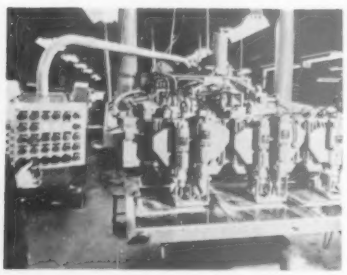
Source: J. W. Lightbourn and F. D. Devault, plant layout engineers, General Electric Company, Phoenix.

Staples do job faster than nails

Switching over from hand-nailing to stapling for assembly of expandable pallets tripled production at Tranter Industries, Franklin, Ind.

It took two men four to six minutes to construct pallets with hand-nailing. Now the job is done by the same two men in one to two minutes. Similar time savings are made on assembly of fan braces, skids, and load dividers.

The lightweight magnesium stapling gun (Fastener Corporation, Franklin Park, Ill.) operates on low air pressure (40 to 60 psi.). It will drive 16-gage galvanized wire staples (with 7/16-in. crowns) 3/4 to 1 1/2 inches into wood.



Tape control snares lost production time

A tape control system has cut the time lag between receiving an order and actual production from days to hours at Photocircuits Corporation, Glen Cove, N.Y. And has improved the quality of operation, too.

For this company, which manufactures printed circuit boards, drilling holes (between 200 and 400) is a costly, precise operation. Misplacing a hole a few thousandths of an inch can cause an assembly-line stoppage. Before Photocircuits automated the procedure, manual presses did the drilling. But the jigs and other tools needed with each new order required weeks of preparation—usually at high costs. And human error was an unavoidable by-product of the operation.

With the new system, information is fed into the tape preparation machine and transposed into perforated drilling instructions. Finished tape is checked against drawings, then placed in the reader of the drilling machine. Holes of five or six sizes are drilled through three circuit boards at a time.

Star points way to quality control

This is no new-fangled game table pierced in the middle, but a large grinding wheel undergoing a quality control test. Gone is the old mallet test to determine resonant frequency —an important indicator of a wheel's density and quality. At MB Electronics Company, New Haven, Conn., an electronic exciter, together with some refractory sand, quickly and accurately tells the quality story.

To test the wheel, the operator first adjusts the oscillator setting to determine the resonant frequency. The sprinkled sand falls into a perfect four-point star pattern on the wheel at resonant frequency. The wheel is supported by two metal standards and cushioned by four sections of padding. This provides 90% isolation of the wheel and reduces electrodynamic excitation requirements.

Eight ways to stretch maintenance dollars

Planning to buy and maintain your own computer, rather than rent equipment or contract for service? Here are eight simple rules that can help you stretch your maintenance dollars and get the most out of your data processing equipment. They were devised by Thomas R. Darmody, vice president of engineering, M and T Company.

1. Make your plans for computer systems maintenance almost as soon as you decide on the purchase. Remember that even a small amount of unplanned downtime will prove more costly than any sensible maintenance program.

2. No computer is made to be 100% operative all the time, unless every component is available in duplicate (100% or better). This means you will have to provide for inoperative time as a normal part of computer operation.

3. Plan for a daily maintenance routine (to take about half an hour or less), preferably at the beginning of the day's work. Or, if the computer is on three-shift operation, it could be at the turnover of one of the shifts.

4. Make sure your operators and programers keep records of every operational fault (including non-recurring ones). Maintenance technicians can use these reports to forestall future troubles through study and corrective work.

5. Remember that mechanical maintenance of the moving parts for any computer system demands a high degree of precision.

6. See that maintenance engineers or technicians are on ready-call so no time is lost in an emergency. Stand-by personnel can often handle some maintenance on parts of the equipment that are not in use.

7. Topnotch maintenance equipment is essential. Transient faults can only be located with high quality instruments. Lost operating time will soon eat up the few dollars saved on cheaper instruments.

8. Make sure your procurement procedures don't hamper fast action when computer parts are needed in an emergency.

Source: Thomas R. Darmody, vice president, engineering, M and T Company, Philadelphia.

COLORED LIGHTS SHOW TRUE COLORS.

DISK SPINS OUT COLOR FORMULA.

Illusion— A TOOL OF COLOR CONTROL

The old saying "seeing is believing" really takes a beating when it comes to color control. It doesn't take much to fool the human eye. What looks like a dark navy-blue shade when light comes from one direction may have a totally different appearance when the light source is changed.

At Crowell Carton Company (division of St. Regis Paper Company), color is always critical. To deal with its color problems, the company set up a department of visiometrics. By using to advantage the many illusions to which the human eye is prone, the department has solved many problems. Here are two interesting examples:

Color as a numerical equation

The department broke down color into a formula based on the fact that color is made up of a primary hue and varying amounts of white and black. The system uses a number of slotted disks—one white, one black, one or more primary colored disks, and a calibrated disk.

The disks are made of plastic with the color fused in. Tests indicate there is no fading of color with this method. The disks are superimposed upon each other on a chromoscope —a plant-made device shown in the two photos at right. When the chromoscope spins, the white, black, and hued disks give the illusion of one color to the human eye. This gives the viewer a chance to pick out the exact color he wants. If the shade is too light or too dark, he adjusts the disks to show a little more white or black. When the precise color appears, the operator marks down the formula as shown on the calibrated disks—such as 50% green, 20% black, and 30% white. The formula always produces the same color.

The next time color is needed for production purposes all that has to be done is to check the formula. There's no chance of fading.

Shuford Mills, Inc., Hickory, N.C. (one of Crowell's customers), has a close tolerance requirement on its orange-and-black display carton. Before the present system was adopted, the distance between the two companies made the updating of color samples a time-consuming job. Now a simple equation for the critical color does the trick.

Lights fool the human eye

A worker may look at two patches of blue on a multi-colored design. The colors look alike, but do they actually match? The answer can easily be obtained at Crowell in its color control room (left photo). The room is equipped with two banks of colored fluorescent lights representing all the basic colors of the rainbow.

The operator simply switches on the fluorescent light of the opposite color to the one he wants to test. In the case of blue, the light is yellow. The yellow light filters out all colors except blue. This color then shows so clearly that any difference in shade can be distinguished easily.

The control room is also equipped with a Densichron (W. M. Welch Manufacturing Company, Chicago). This device measures the density of printing ink on a sheet of paperboard. Density measurement is important to both the paper and textile industries, because any variation in density means the color of the ink or dye will differ.

Source: Alf Nelson, Director of Visiometrics, Crowell Carton Company, division of St. Regis Paper Company, Marshall, Mich.

QUICK-CHANGE PLANT SNAKE PIT

No, this is not the reptile house at the Bronx Zoo. It's the liquid transferring room at the new Garland, Tex., plant of Sherwin-Williams Company. Varnish and processed liquids can quickly be sent to any plant area just by attaching a hose to the correct pipe line. The system lends flexibility to the mammoth job of handling about 350,000 gallons of materials held in tanks surrounding this area.

YOU BE THE ARBITRATOR

Continued from page 166

The award—The arbitrator said: "A written agreement that is clear on its face can be modified only in writing. Past practice may properly be invoked to determine the intent of an unclear provision, but it may not be invoked to vitiate the terms of an unambiguous provision, especially where deviation from the agreement's terms occurred after specific notice to the union and without the union's consent." The union won the case and, since it was the arbitrator's opinion that the women on layoff could have performed the clean-up work, he ordered the company to reimburse them for the time involved.

Caution: The award in this case is not an indication of how other arbitrators might rule in other apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony and other facts involved.

Treasure hunting in scrap hill

"There's gold in that thar hill" decided Johns-Manville Products Corporation recently, inspecting the scrap heap in its Richmond, Ind., plant. The scrap hill turned out to be a real money-making lode.

A look at unused material piled to the rafters convinced J-M it should launch salvaging operations. In two months, $3000 worth of unused material was restored to working use. And salvaged equipment was added to the inventory control program to avert the purchase of materials already on hand.

What is salvage? It's any usable material that can be returned to a safe operating condition, says J-M. The plant gives parts with high turnover—bearings, valves, pipe fittings—top priority for fast return and re-issue through the storeroom. Low-turnover parts are cleaned and stored until needed. Retired or replaced equipment and machines go to the "salvage center" for dismantling. Obsolete piping is disassembled and re-usable parts are restored. Unsalvagable material (brass, copper, bronze, cast iron, steel, etc.) is sold as scrap.

The chief storekeeper, who is in charge of the program, decides whether to rebuild or junk parts. Worthless material is disposed of on an authorization from the plant engineer or maintenance foreman.

Source: K. H. Slater, Senior Methods Engineer, Johns-Manville Products Corporation, New York.

Short and simple safety slogan

When a rash of hand injuries broke out among workers at E. I. du Pont de Nemours & Company, Wilmington, Del., the company embarked on a program to alert employees to accident hazards around the plant. Safety slogans, such as the one shown, were set up. They're short and to the point, with no meaningless sophistication.

These slogans show up on pencils, notepads, bulletin boards, posters, and company publications. They are repeated even to the point of being mildly irritating to employees, and have proved an effective tool against carelessness.

Train dubs as conveyor

Old number 51 of the Southern Railroad, which makes the run from Cincinnati to Atlanta, is more than just another train. It's actually an extension of a conveyor line bringing boxcar loads of auto parts to one Ford Motor Company and two General Motors Corporation final assembly plants in Atlanta.

With this train, called the "Sparkplug," these companies can keep their inventories at a minimum in final assembly areas. And cut down their warehousing costs. In fact, if the train ever failed to show up, some employees in Atlanta would not be able to do their work.

The standard of the industry

Four short years ago this fork truck was only a dream in the minds of thousands of materials handling engineers, plant operating people, and fork lift operators across the country. Today the Clarklift® is the most widely accepted truck in the industry.

How does this fork truck become the standard of the industry in four short years? . . . by having the inherent qualities and design features that materials handling experts want and need.

Before the first pencil line was drawn to design this new fork truck, the Clark Equipment Company surveyed thousands of plant operating people. The results were tabulated . . . and after thousands of engineering and test hours and millions of dollars . . . the Clarklift was completed and introduced.

Since its introduction, the Clarklift has become the standard of the industry. Today more Clarklift fork trucks are sold than any other fork trucks.

For more information on the Clarklift . . . or, better yet for a demonstration . . . contact your local Clark dealer. He's listed in the Yellow Pages. Or, write Clarklift, Clark Equipment Company, Battle Creek, Michigan.

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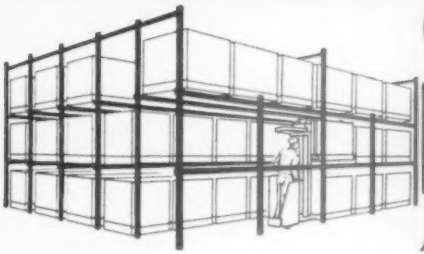
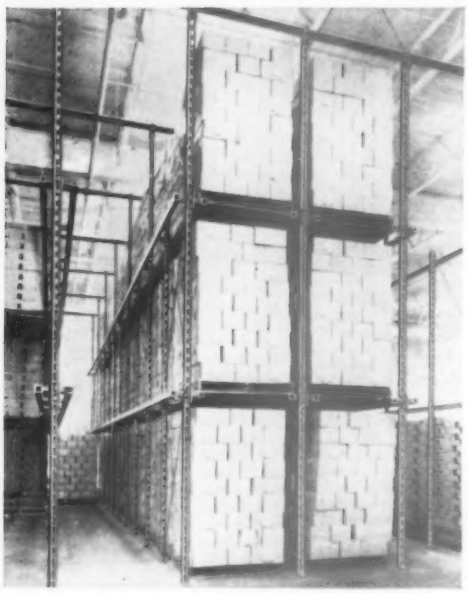
American OPEN-END Drive-In or Drive-Thru ADJUSTABLE RACKS



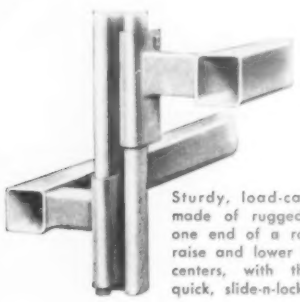
The rack that makes aisle space storage space . . . allows you to store more at less cost!



American Open-End Rack installation at Bissell, Inc., Grand Rapids, Michigan.

YOU CAN utilize every cubic foot of storage space in your warehouse with American Open-End Racks. Here's why: American Racks are so designed that you can stack in space formerly used as aisle space. American "Drive-Thru" Racks are open at both ends for truck travel all the way through, for first-in, first-out storage. American "Drive-In" Racks, with one end open, are for use against a wall, or where first-in, first-out storage is not necessary. American trigger-quick, slide-n-lock stringers are the last word in quick adjustability. Send for more facts that prove you get the most storage space — and the most in storage efficiency and flexibility — with rugged American Open-End Racks.

send for literature



Sturdy, load-carrying stringers are made of rugged square tubing from one end of a row to the other. They raise and lower like a window, on 4" centers, with the American trigger-quick, slide-n-lock method of assembly.

AMERICAN METAL PRODUCTS COMPANY

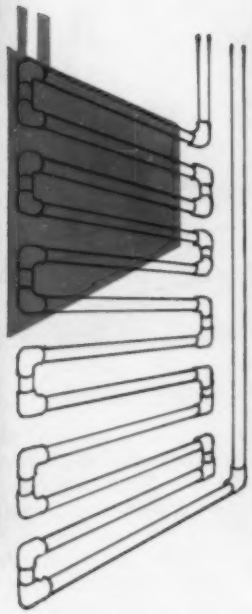
STORAGE RACK DIVISION

5965 Linsdale Ave. amp® Detroit 4, Michigan

Manufactured in Canada by Sunshine-Waterloo Co., Ltd., Waterloo, Ontario

For more facts circle 461 on Reader Service Card

NEW MULTI-ZONE PLATECOIL® SAVES TANK SPACE

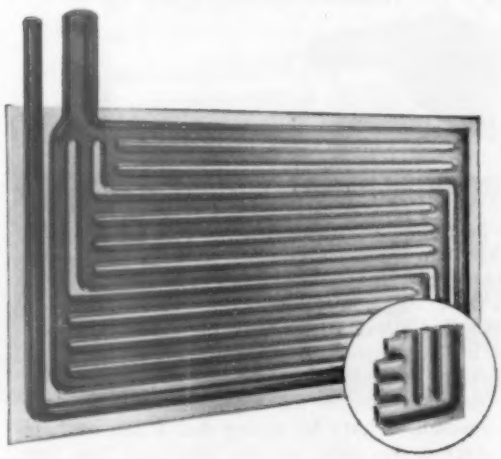


Operating Pressures up to 250 psi

Patented

Compact PLATECOIL units have replaced pipe coils in thousands of tank and process heating and cooling applications. High heat transfer per unit of surface and greater overall effective heat transfer surface permit the use of PLATECOIL which takes up less valuable tank space than pipe coils of equivalent capacity. In many cases this eliminates the need for additional tanks by increasing the capacity of existing tanks or processing vessels.

NOW – MORE TANK AND PROCESS EFFICIENCY THROUGH FASTER START-UP: LESS DOWNTIME



High heat transfer per square foot of surface and greater effective surface through better steam distribution produce a reserve heating capacity in the new MULTI-ZONE PLATECOIL. This reserve capacity delivers amazing heat transfer under overload conditions during tank and process "start-up" periods. "Downtime" is cut and the same heating capacity provides fast recovery of desired temperatures after introduction of "cold" work loads to preserve overall processing efficiency.

In addition to performance advantages, PLATECOIL presents substantial cost advantages. PLATECOIL is lightweight and easy to install. Streamlined PLATECOIL surfaces do not tend to collect deposits as do pipe coils and cleaning is a simple, economical operation. All stainless steel and alloy PLATECOIL units affected by cold working are annealed and pickled after fabrication to return the metal to its original condition and thus eliminate the probability of corrosion due to internal stresses and carbide precipitation.

PLATECOIL is available in standard styles, sizes and materials to fit a wide variety of applications. A complete line of accessories to facilitate engineering and installation adds to PLATECOIL versatility. Special PLATECOIL can be factory-fabricated to special needs.

Send for Bulletin P60 for complete data.

Tranter Manufacturing, Inc.

LANSING 9, MICHIGAN

PLATECOIL® DIVISION

HUMAN RELATIONS

By V. E. LUNARDI, Assistant Editor, FACTORY

Rx: coffee every three hours . . .

Does the daily coffee break fail to provide your employees with that mid-morning and mid-afternoon "pick-up?" If so, the trouble is Tachyphylaxis, or caffeine block. The cure: Check your timing on that second cup—it may be off.

Experiments by Drs. Edward F. Domino and Ajit K. Maiti of the University of Michigan Medical Center (Ann Arbor) show that caffeine in one cup of coffee partially blocks effects of the second cup for about three hours. Caffeine, although stimulating, also gives temporary immunization against further stimulation. So watch that clock. A 7:30 a.m. breakfast cup should last until the 10:30 a.m. coffee break. Then at 10:50 a.m. comes the peak that will continue for 2½ hours.

. . . or no coffee, but higher wages

In Chicago, 6800 employees of a plumbers' union local are immune to caffeine block. No, they're not drinking tea. They're not drinking anything because, recently, they voluntarily gave up this coffee break for wage increases. Time saved is said to add up to about $3.4-million yearly for employers.

Something of value—insured

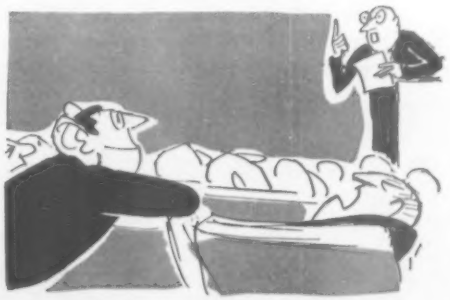
Since 1956, companies have been taking an ever-growing mother-hen attitude toward traveling employees. Of 319 manufacturing companies recently surveyed by the National Industrial Conference Board, New York, three out of four cover employees with some form of insurance against business travel hazards. This compares with two out of three in the 1956 survey covering 281 firms. The trend is away from limited policies and toward all-risk or blanket coverage. Despite this extended coverage to a larger number of employees, costs are nominal compared with other employee benefits.

Wanted: novel wheel chair

It should be able to do practically everything but fly —with a 200-lb. occupant. Such is the proposal for this yet-to-be-invented wheel chair that's needed to move the physically handicapped around industrial buildings. To its inventor will go a $5000 prize donated by a private citizen long interested in the betterment of the physically handicapped.

The challenge to build this wheel chair was delivered by Secretary of Commerce Frederick H. Mueller, speaking for the National Inventors Council, and Maj.-Gen. Melvin J. Maas, USMCR, Ret., who is chairman of the President's Committee on Employment of the Physically Handicapped.

To be judged perfect, the chair must weigh between 50 and 75 pounds, fold compactly for storage inside a car, negotiate average stairs—preferably without an attendant for the ascent, be self-propelled, and retail for less than $500. The National Inventors Council, Washington, D. C., will receive and screen all suggestions for the chair's design.



Are you turning a deaf ear?

Now hear this, you conference-goers. Are you the average man without training in comprehension who listens at only 25% efficiency? If so, you will benefit from these 10 guides to good listening suggested by Dr. Ralph G. Nichols, head of the rhetoric department at the University of Minnesota Institute of Agriculture in St. Paul:

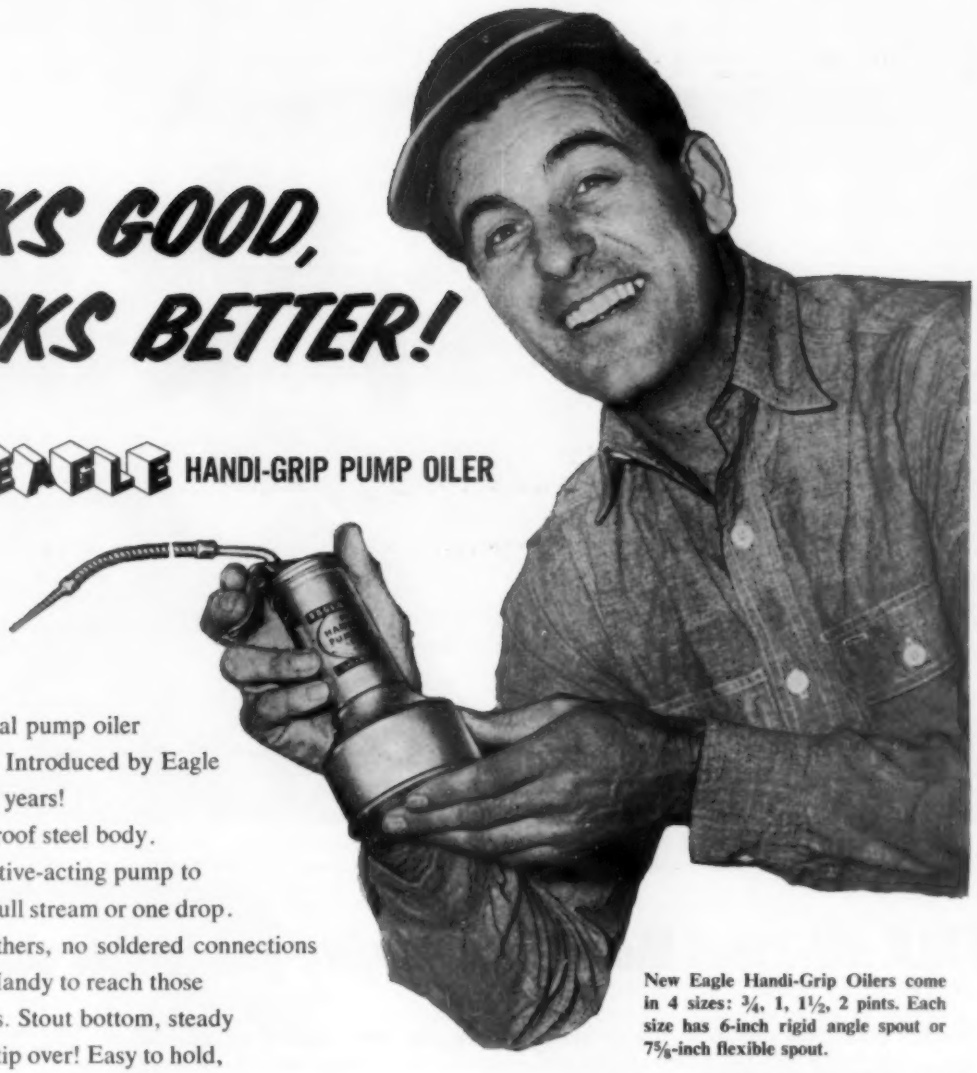
1. Be interested in the topic under discussion. Ask yourself: What's he saying that I can use? If you discard the topic as dry after the first few sentences, you've paved the way to rationalize your future inattention.

2. Judge contents, not presentation and delivery. Learn to milk the speech or discussion for information you need.

Turn the page

LOOKS GOOD, WORKS BETTER!

THE NEW EAGLE HANDI-GRIP PUMP OILER



Here's the ideal pump oiler for every use! Introduced by Eagle Guaranteed 5 years! Strong, leakproof steel body. Powerful positive-acting pump to deliver oil in full stream or one drop. No pump leathers, no soldered connections to wear out. Handy to reach those difficult places. Stout bottom, steady stance, won't tip over! Easy to hold, easy to use, reasonably priced.

New Eagle Handi-Grip Oilers come in 4 sizes: ¾, 1, 1½, 2 pints. Each size has 6-inch rigid angle spout or 7⅝-inch flexible spout.

ORDER FROM YOUR SUPPLIER

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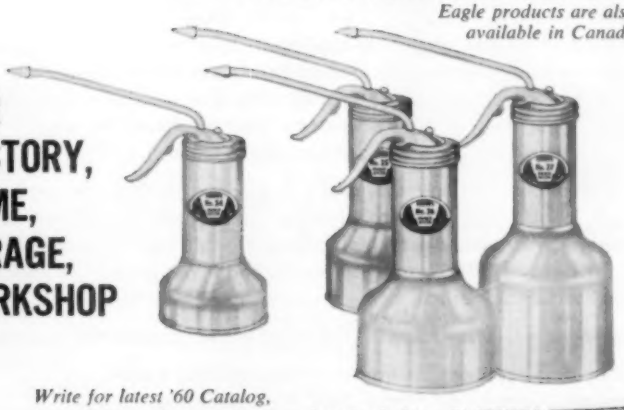

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SERVING THE TRADE SINCE 1894

For more facts Circle 463 on Reader Service Card

FALK Motoreducers driving log conveyor and refuse conveyor at the modern mill of The Bohemia Lumber Company, Culp Creek, Oregon.

FALK *all-steel* Motoreducers give you longer service life

Whether your load conditions are normal or heavy, the extra rigidity of all-steel construction (more than twice that of cast iron) maintains better alignment of revolving elements under load...a vital factor in prolonging the service life of gears and bearings.

And if your installations are subject to shock loads, or accidental external impacts, you're way ahead when you install Falk All-Steel Motoreducers. These rugged units do not destroy themselves by tearing off their feet under jamming overloads, nor are their housings subject to cracks which both dissipate the vital lubricant supply and allow revolving elements to get out of alignment.

All-steel construction is one of the built-in extras that you get in Falk Motoreducers. Others include: (1) inherently stronger gear teeth (by AGMA standards), thanks to exclusive Falk extra-depth, high pressure angle helical gears; (2) maximum mechanical efficiency (98½% per gear mesh, under full load); (3) your choice of standard units (horizontal, vertical or right angle) to fit your precise requirements.

HORSEPOWER RANGE: to 75 hp . . . STANDARD OUTPUT SPEEDS: 780 rpm (high) to 1.2 rpm (low).

Prompt delivery from distributor stocks, or from warehouse or factory. Ask your Falk Representative or Authorized Falk Distributor for ***Bulletin 3100.***

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MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS

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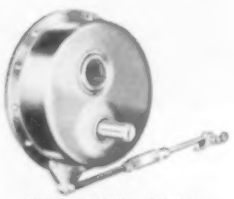
THE FALK ALL-MOTOR MOTOREDUCER
...the original All-Motor unit



THE ALL-STEEL FALK SHAFT MOUNTED DRIVE

Torque ratings to 44,000 lb-in at low speed shaft. Also available in flange-mount design.

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Begins on page 174

3. Hold back your instinct for rebutting the speaker's argument. Wrapped in your own mental processes, you can lose his subsequent passages.

4. Digest the meat of the speech, leave the bones for the poor listeners. Discriminate between fact and principle, idea and example, evidence and argument.

5. Make brief notes on the speaker's salient points. Don't try to take a verbatim record.

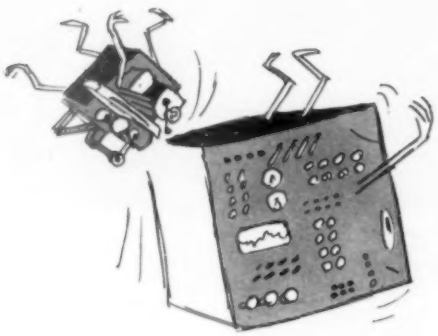
6. Give the speaker your undivided attention. It may be hard work, but don't be caught napping and miss out on information you can use.

7. Fight distractions by concentrating. Poor listeners tend to be distracted even when face-to-face with a speaker.

8. Overcome emotional conflict with the speaker's contradictory views on your pet notions, convictions, and complexes. Listen with an open mind.

9. Develop your mind to understand difficult, expository material. You can't be a good listener if a speaker's nomenclature is 'way over your head.

10. Don't waste your thought speed. People speak about 125 words per minute, but you can think easily at about four times this rate. This extra thinking time could be used to summarize remarks, anticipate subsequent points, etc.



Engines snub automated lines

Autoworkers in Canada have good reason to relax about automation. It appears to have taken a tumble in the automotive industry there. Perhaps not for all time, but at least for the immediate future. Today automatic machines valued at over $50-million are working only a few hours a week.

Why the sudden change? Typical of the about-face is Ford Company of Canada's attitude. It installed modern and efficient single machines in its plants to make components for six-cylinder and Falcon engines. Less expensive to install and at a lower capital investment than automatic equipment, these lines are adequate to meet the company's production needs. Also, maintenance of these simpler lines requires fewer high-paid skilled operators. Finally, because there's no tie-in with complex automatic transfer equipment, the entire line does not come to a standstill if one machine fails.

Turn the page

SEE IT WHEN IT

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PHILCO CLOSED CIRCUIT TV
has many applications that will speed production, control operations, improve communications, increase security *in your plant!*

Industry is rapidly adopting closed circuit TV to speed operations and reduce costs by enabling management and operating personnel to "see it when it happens"! Philco's broad experience in CCTV will help you to make the most efficient use of this modern and flexible business tool. Philco has pioneered in fully-transistorized equipment that provides maximum reliability and freedom from maintenance. It is as easy to operate as your home TV. Write today for your free copy of the Philco Closed Circuit TV System Planning Guide.

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Complete with batteries and built-in charger—1500 lb. capacity—57" lifting ht.—manually propelled—power lift.

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Complete with batteries and built-in charger—1500 lb. capacity—110" lifting ht.

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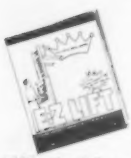

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178 **For more facts Circle 466 on Reader Service Card**

Begins on page 174

Color slides map the way

Norden, a division of United Aircraft Corporation, is transporting its White Plains (N.Y.) and Milford (Conn.) employees to Norwalk (Conn.) during lunch periods. Not bodily, of course, but by means of color slides that show the division's future home in Norwalk and its neighboring cities and towns.

The 15-min. screenings are part of a program to give employees a better-than-nodding acquaintance with the area before moving day.

Safety really pays

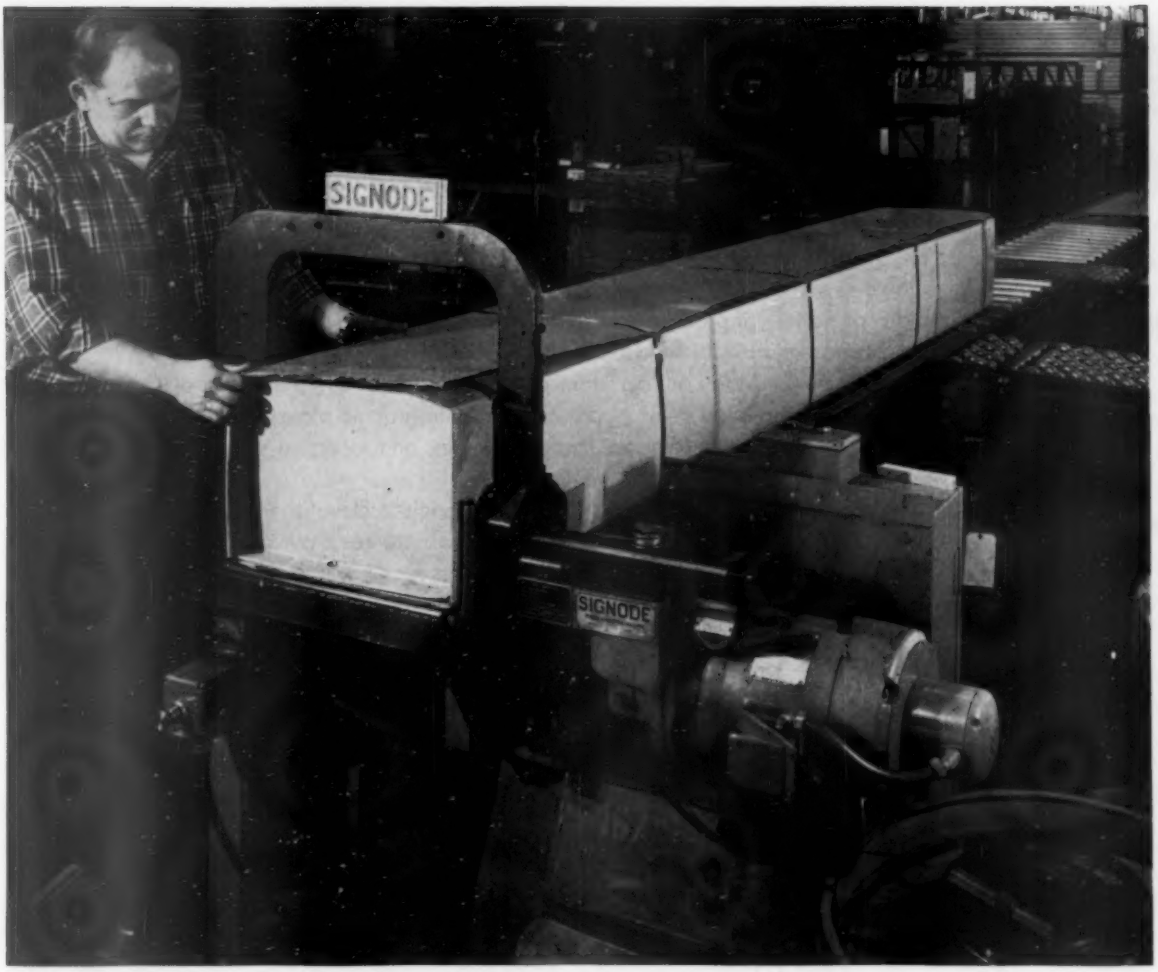
A pink slip brings a chuckle instead of a frown at Lockheed Aircraft Corporation, Marietta, Ga. No dismissal notice, it's a high readership cartoon with a safety message. Each pay day, a new cartoon is clipped to the pay envelopes of 520 plant engineering department employees. Accident hazards are hammered home with a smile by the department's mechanical engineer who does the cartooning. It costs little to instill this safety consciousness. Slips are run off in the plant's duplicating office.

One *faux pas* per applicant

McGraw-Hill records show that only half of all management men stay put in a job over a 12-month period. If you're a "man on the move," here's some news to ease your job-hunting worries. Nowadays, one bad reference doesn't disqualify you from getting a new job, says *Industrial Relations News,* New York. A 25-company survey shows that one negative reference from a former boss won't squash your chances, although a series might. And most companies overlook fibbing on applications.

Only 15 of the 25 companies check references before hiring; 10 of them delay investigation until the applicant joins the firm. When checking employee references, ex-bosses turn into loyal supporters. They don't often tattle on former employees.

Application forms aren't always closely checked either. Again, 15 of the companies give them a detailed going-over. One company reports that it checks only engineers' application forms, and it gives female clerical workers job offers on the spot.



New Signode high-speed strapping machines

It's simple. The operator positions the package or bundle, steps on the foot switch, and the strapping is applied, sealed, and severed in seconds ...more than fast enough for the highest production rates.

New M-20 Series machines apply strapping smoothly, without impact, without denting or marring your product. They maintain uniform tension at any desired value between 50 and 1500 pounds.

Life tests and up to five years of industrial operation prove that M-20 machines complete half a million strapping operations before requiring more than routine maintenance.

Strap ends are joined mechanically with a metal seal that visibly insures a proper joint regardless of dirt, paint or oil. 3-HP motors insure against overloading even at maximum tension. Easy to use, easy to learn to use. Packages can move through the machine in either direction.

Each M-20 Model straps a wide range of mixed package sizes.

This new series of six standard M-20 machines is the result of 15 years of Signode experience in designing and building most of the power strapping machines now in use.

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3M COMPANY has branched out from its original sandpaper business into a wide variety of product lines. However, most of these product lines are direct descendants of sandpaper, 3M's original product, in the sense that **coating techniques* play an important part in these products. This is true of such seemingly unrelated items as presensitized lithographic plates, pressure sensitive tapes, decorative ribbon, roofing granules and reflective sheeting.

As specialists, we liked the OTIS specialist's approach to Elevator Maintenance right from the start. We decided it was the only way to keep our 6 OTIS Passenger Elevators and 10 OTIS Freight Elevators running at their original efficiency during their entire lifetime. We've been using OTIS Elevator Maintenance since 1933.

What is the OTIS specialist's approach to elevator maintenance? It is MEN . . . MATERIALS . . . METHODS.

MEN: Elevator maintenance is no one-man job. It is an organization task requiring experts in many lines. No individual, even if he devoted his entire time to the job, could do it properly. It calls for men with an unusual combination of skills plus long training in studying parts, assemblies, functions, replacement procedures, testing and adjusting. Some degree of elevator complexity can be gleaned from the illustration at the right.

MATERIALS: Original OTIS parts and specially designed OTIS maintenance equipment are within one hour of 90% of all OTIS elevators in the U. S. for use in scheduled replacements—and to hold emergency shutdowns to a minimum.

METHODS: With more than 40,000 elevators under OTIS maintenance, OTIS has developed an actuarial procedure that replaces wearing parts well in advance of their breakdown point to hold shutdowns to an absolute minimum and assure the highest possible safety.

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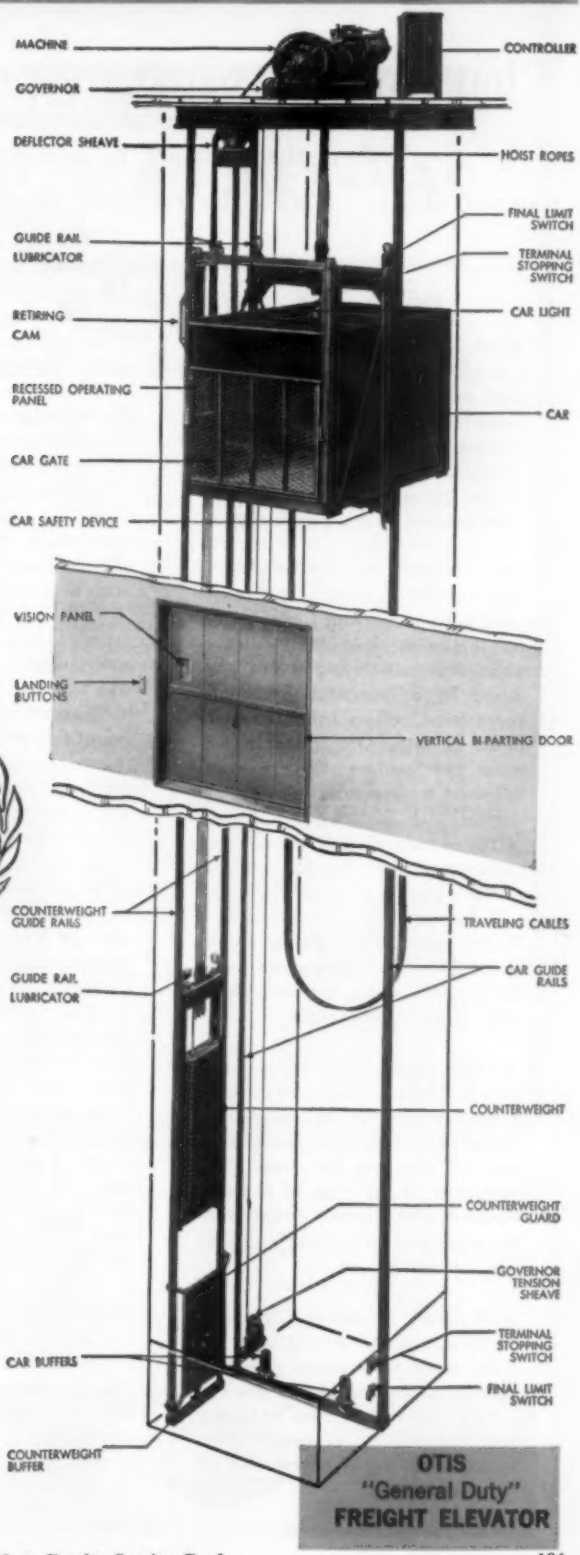

3M COMPANY

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By PAUL A. KING, Member, New York Bar

What happens when your contract is silent?

When the contract is non-specific, the company often gets its way—but not always. Here's the rationale illustrated by three decisions.

NEWS TIPS

- When an employee wants to join a rival union, try to stay neutral. One employer was charged with unfair labor practice when he yielded to union pressure and discriminated against such an employee by stopping pension plan contributions on his behalf.

- Don't worry about making compromise offers during the grievance procedure. Arbitrator Clair V. Duff has made it clear that when a definite understanding is not produced at a grievance procedure conference, offers and counter-offers of settlement cannot determine the pattern that will be followed by the arbitrator.

- You're not always relieved of call-in pay even if your contract protects you when work is unavailable for causes beyond your control. In the case of machinery breakdown, many arbitrators will make you pay if they feel the breakdown might have been avoided.

- Put a ceiling on the pay you'll give employees who spend time on union business. Otherwise, an arbitrator might rule that you're stuck with full pay and little work. This happened in the case of a senior leadman who became chairman of the plant committee, and had little time left for his job.

- As a rule, it's too late to call in an outside guard service after the union starts to organize your regular force. But sometimes you can—if you can convince the NLRB that you had such a program in the works some weeks before the organizing started.

When there is a peak load in a small plant, everyone is expected to chip in—and that goes for supervisors, too. But if the plant is organized, supervisors can't always work alongside the unit members. If the contract says that supervisors can't do a lick of production work, that's usually the end of it—except for an emergency.

If there's nary a word in the contract on the subject, then what? One arbitrator allowed a supervisor to put in more than 50% of his time in the unit. This supervisor had been doing this kind of work before the contract was signed. But even so, arbitration awards permitting supervisors to do production work where the contract is silent are not uncommon. Unions generally argue, and not too successfully, that supervisors are excluded from the unit on the basis of job descriptions, that they displace workers. Arbitrators disagree and, in support, haul out the residual rights theory.

Said Arbitrator Burton Turkus in one case: "It is a well-settled principle that, after the execution of a collective bargaining agreement, an employer retains all of the rights to manage and control its business which it had prior to that agreement, less any rights it has divested itself of or relinquished in the agreement."

But this principle must be taken with a small grain of salt, although generally applicable. A company can carelessly throw away a residual right by permitting a past practice to develop covering that right. This past practice, even though not mentioned in the contract, may be enforced by an arbitrator on the legal theory of estoppel—that the union has a right to rely on past practice.

In one case, the contract said in unmistakable terms that holiday pay would be given to employees reporting to work the day before and the day after the holiday. Two employees were denied holiday pay when absent on the qualifying days because of deaths in the family. According to the letter of the contract, these two workers were not entitled to pay. But because of a practice of granting such pay in this type of case, the arbitrator ruled that the company was estopped from enforcing the contract. Moral: To avoid contract clause atrophy, enforce the clause to the letter. Avoid negating past practice.

Here's a brighter side to the silent contract picture: If the contract says nothing, you can have work sharing. For management, this means keeping skilled or trained employees around for the work pick-up. For the union, it means less pay for senior employees. Question: If the contract says nothing, can the employer order work sharing without taking it up with the union? Yes, answered Arbitrator John W. May. Here's his response to stock union arguments:

(1) *The layoff provisions were violated:* A layoff implies job separation. No employees were laid off here. They all worked.

(2) *The union is the employee's collective bargaining agent as to hours of work:* The normal hours of work had been agreed upon by the parties—namely a 5-day week. This is a norm, not a maximum or minimum. In industry, hours can exceed or fall below the normal work week. It's not a guarantee of a 5-day week.

(3) *In the past the company used layoff during slack periods:* This is not controlling. It doesn't bar work sharing.

Turn the page

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BATTERY-POWERED SCRUBBER-VAC

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For consultation or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2508 East Street, Elkhart, Indiana. Branch Offices in all principal cities of the United States and Canada.

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Begins on page 182

Harassing tactics during negotiations

They're okay, rules the United States Supreme Court.

When a contract is up, the union can strike if it's not happy with the way negotiations are going. But while a strike can cripple the company, it also plays havoc with the pay envelope of the striker. An insurance agents' union developed a plan where it could have its pie and eat it, too. Instead of striking against the company (Rock of Gibraltar Prudential), it decided to chip away by use of harassing tactics.

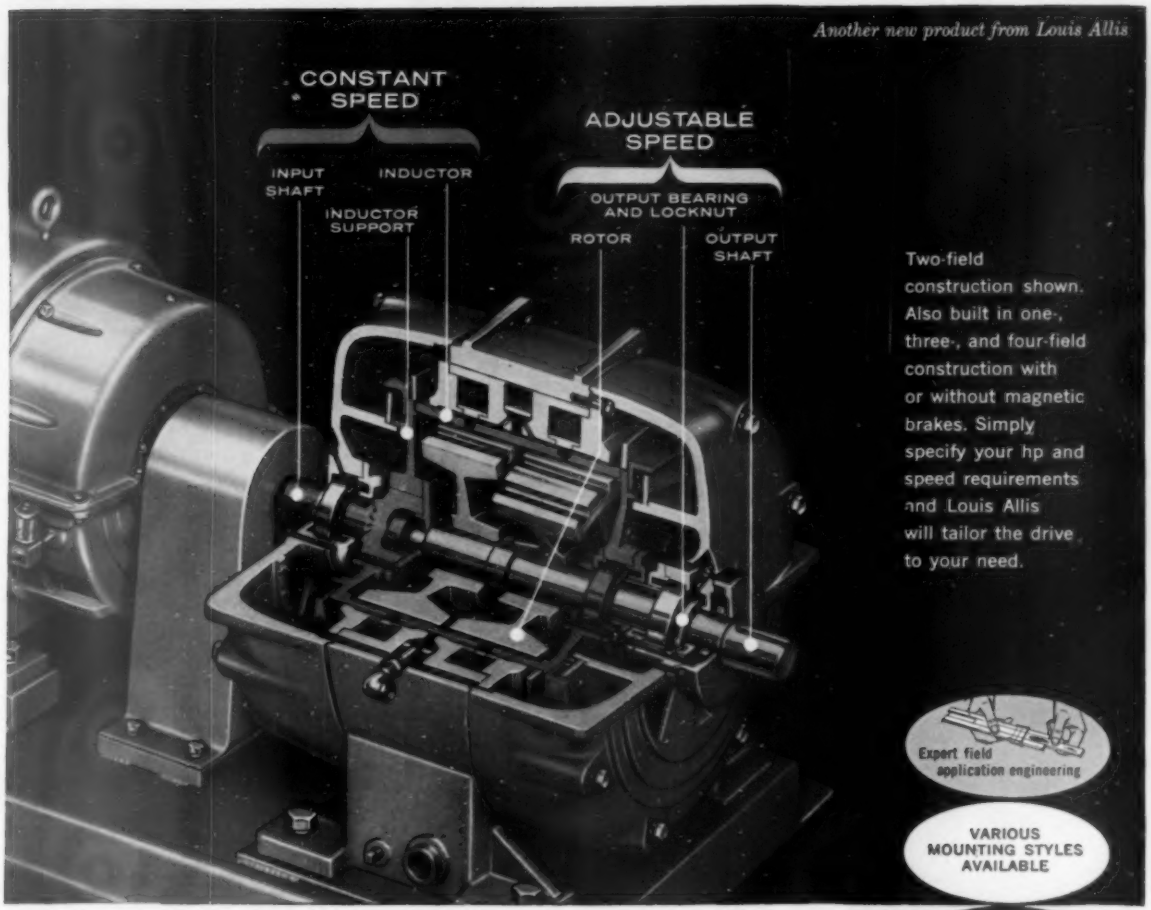
These were: refusal for a time to solicit new business; refusal to comply with the company's reporting procedures; refusal to participate in the company's May Policyholders' Month campaign; reporting late at district offices; refusal to perform customary duties at the offices; participation in sit-in mornings; leaving at noon as a group; absenting themselves from special business conferences; picketing and distributing leaflets outside various offices; distributing leaflets to policyholders and soliciting their signatures on petitions directed to the company; engaging in mass demonstrations.

Sure, the company could have disciplined these employees for such conduct. But it felt that would make matters worse. It, therefore, tried a new tactic—filed an unfair labor practice charge against the union claiming it had failed to bargain in good faith.

The NLRB agreed that these activities of the employees were evidence of not bargaining in good faith—that it was an unfair labor practice. But in so concluding the Board completely overlooked the fact that while the employees were harassing the company, the union leaders were still negotiating with the company over the terms of the new contract.

The Supreme Court didn't see it the NLRB way at all. In its view, the union could go out on strike—a total affair. A strike was an economic weapon available to the union—a way of putting the heat on the employer. The harassing measures were just another way of putting

Another new product from Louis Allis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Based on a liquid-cooled magnetic coupling design, the *all-new* Louis Allis Magnetic Drive offers you the finest in precise regulation, compactness, and design flexibility for adjustable speed drives up to 2000 hp.

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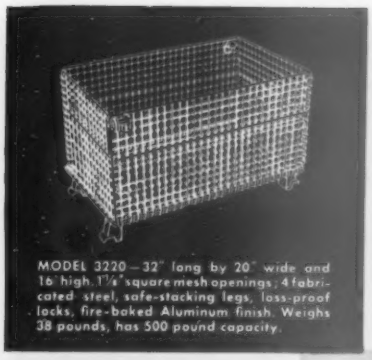

MODEL 3220—32" long by 20" wide and 16" high. 1⅛" square mesh openings; 4 fabricated steel, safe-stacking legs, loss-proof locks, fire-baked Aluminum finish. Weighs 38 pounds, has 500 pound capacity.

FOLD-DOWN FEATURE—Both Model 3220 and 3220SGC fold down quickly and easily to save over 75% of the open area. This feature saves storage space, makes handling easier and lowers return shipping costs.

And now... the new 'JUNIOR' PALLETAINERS®

The new 'Junior' Palletainer models are sturdy, close-meshed, all-steel containers designed for more efficient handling, storage, protection and safe transit of *any* small parts. Ruggedly built of reinforced, welded steel rod mesh, the 'Juniors' incorporate many of the outstanding construction and convenience features found only on the larger, heavy duty Palletainers.

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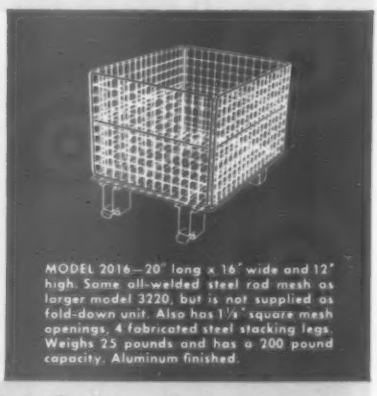
MODEL 3220SGC WITH SIDE GATE—Dimensions of the model 3220SGC are the same as those of the regular 3220 model except that this unit is equipped with a hinged, Type "C" side gate for quick, easy access. Use of side gate does not affect stackability or safety.



MODEL 2016—20" long x 16" wide and 12" high. Same all-welded steel rod mesh as larger model 3220, but is not supplied as fold-down unit. Also has 1⅛" square mesh openings, 4 fabricated steel stacking legs. Weighs 25 pounds and has a 200 pound capacity. Aluminum finished.

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Begins on page 182

pressure on the company, felt the high court! "The use of economic pressure . . . is of itself not at all inconsistent with the duty of bargaining in good faith." The Board does not have the power under the NLRA, it continued, to decide which economic weapons can be used and which cannot. The Board has not "been afforded flexibility in picking and choosing which economic devices of labor and management shall be branded as unlawful."

What to know when you arbitrate

Union leaders were given special instruction on handling arbitration cases. What they were told can be of value to your arbitration case handlers.

For four days, 30 union representatives went to a special union-run school to find out how to prepare, handle, and win arbitrations. Here's a run-down of some instructions they received that might be of interest and value to management's arbitration case handlers:

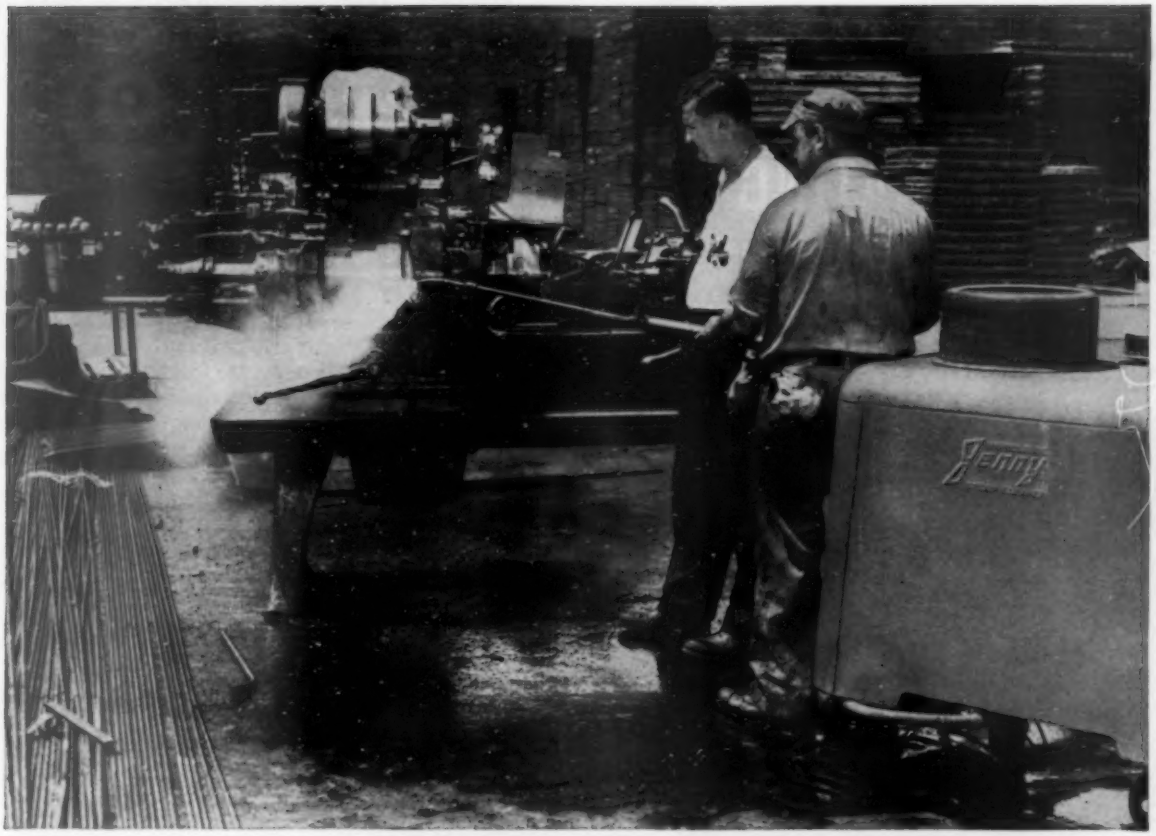
(1) Know the arbitrator—if he is a permanent one. By studying him you can make an educated guess as to how you'll make out—and perhaps you'll decide to settle the case. Of course, it's harder to know the *ad hoc* arbitrator and what makes him tick. However, it would pay to read the awards of the arbitrators on the suggested list to get an idea of their philosophy so you can pick the right man for your case.

(2) Follow the time limits of the contract's grievance and arbitration procedures carefully. Of late, unions have lost several arbitration cases because of their failure to process grievances promptly. For management, this advice can be translated into: Insist upon strict compliance with the time limits of the grievance procedure.

(3) Think twice about going to arbitration on a point that, if you win, the other party will try to remedy at the next contract negotiation with a good chance of succeeding.

(4) Define the grievance clearly.

(5) Set forth your position based



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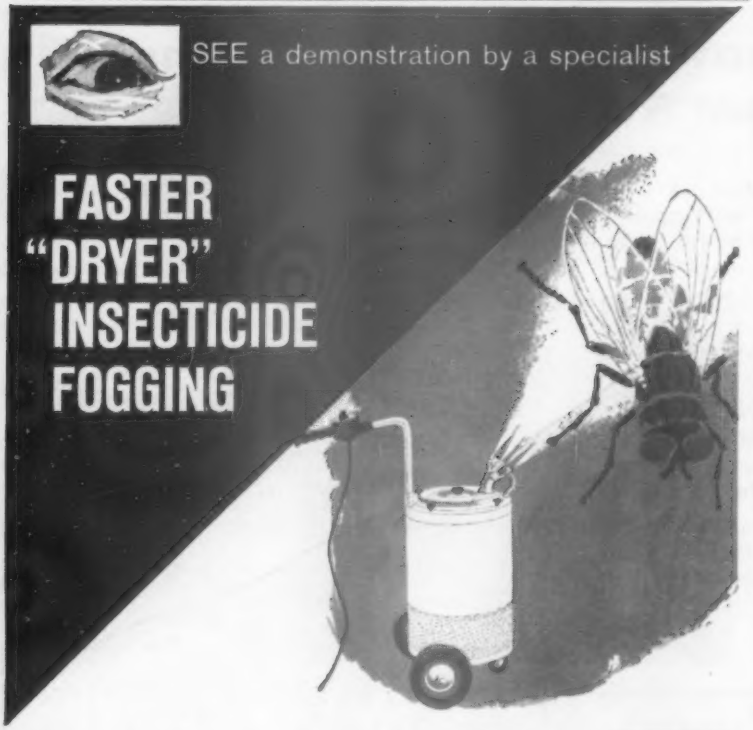

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on contract language and past practice. Past practice may show that there was an agreed-upon right. As an argument, past practice is strengthened where the contract has a provision protecting pre-existing practices. It's weakened when the definition of arbitrable matters is narrow—or where there is a clause stating that a union cannot add to or modify the contract. A broad management rights clause also toughens the union's case. If past practice won't help, union arbitration handlers were advised to fall back on equity and fairness.

(6) Outline company's position—what it is likely to argue. (For management, read "outline union's probable case.")

(7) Speak to the witnesses. Prepare them.

(8) Avoid personal attacks during the hearing. The arbitrator may be adversely affected.

(9) Give arbitrator written examples where issues are complicated. Don't rely on oral presentation.

(10) Let one man do the talking.

Seniority credit for supervisory ranks

Have your union members been reluctant to accept supervisory jobs? A seniority clause in your contract may overcome their reluctance.

One place to look for supervisors is the bargaining unit. You may not always find good supervisory material there, but if you do you'd like that union member to accept the promotion. He may not do so if he feels the supervisory job may be eliminated some day in the future. In that case, he may not be able to bounce back into the unit—or if he does bounce back, he may not receive seniority credit for the time spent as a supervisor. He is jittery when the union contract is silent on the subject—and rightfully so. Arbitrators disagree as to the handling of such cases and security-minded union members like certainty. Some arbitrators have ruled that seniority can be acquired after promotion to a supervisory job. Some say no.

Turn to page 192

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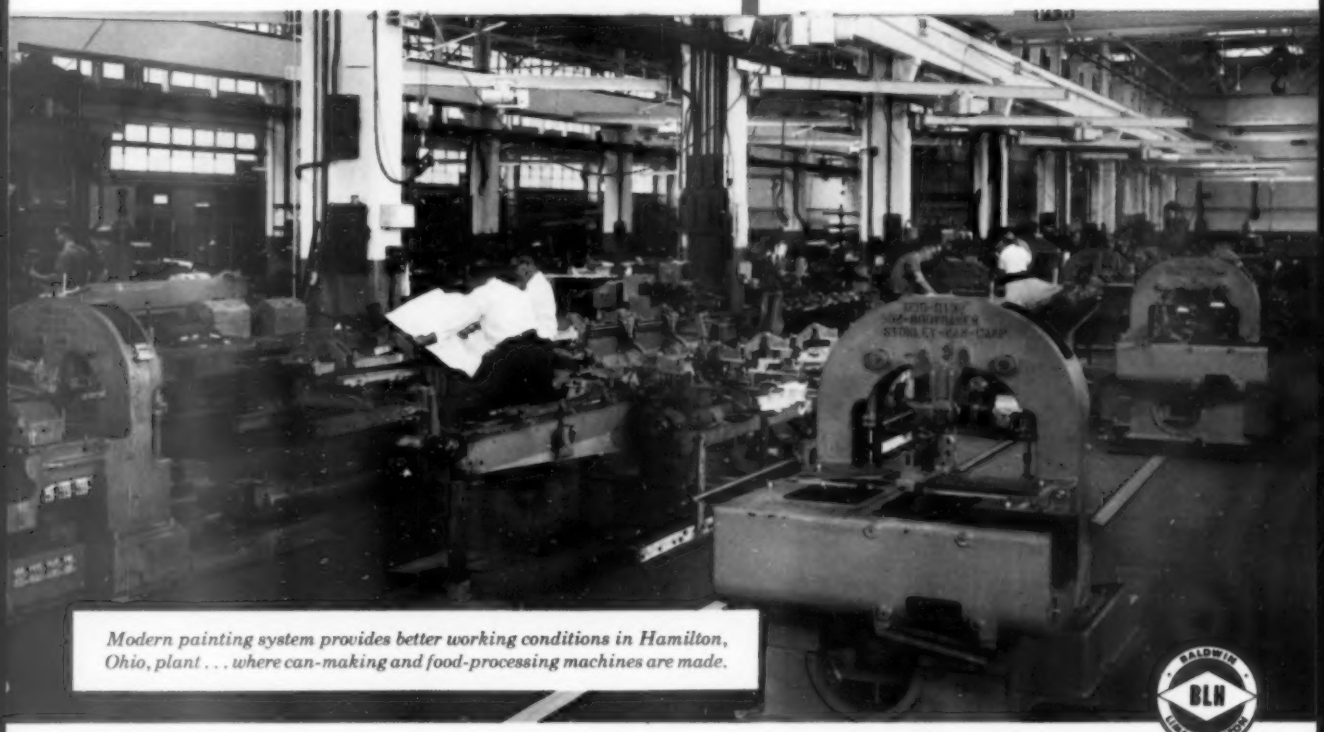
USES PITTSBURGH COLOR DYNAMICS®

to improve production efficiency and safety



Modern painting system provides better working conditions in Hamilton, Ohio, plant . . . where can-making and food-processing machines are made.

Greater productive efficiency, higher morale and fewer time-loss accidents. These are the chief benefits from the use of Pittsburgh's painting system of COLOR DYNAMICS at the Hamilton, Ohio, division of the Baldwin-Lima-Hamilton Corp.

The versatility and scope of the engineering skills of this organization are world-famous. Its Hamilton division includes plants which build heavy-duty Diesel engines, power transmissions for submarines, and components for atomic aircraft and guided missiles. Other plants build elephant-type and railroad shop machine tools as well as compacting and other types of hydraulic and mechanical presses.

The plant shown, repainted according to COLOR DYNAMICS, produces can-making machinery and special automated equipment for food processors and packagers.

"Work areas are made more cheerful and pleasing," comments William F. Boyle, vice president and general manager at Hamilton, "by the use of COLOR DYNAMICS hues of high reflectance. Eye-rest and focal colors on machinery and lower walls relieve eyestrain. Our operators see their tasks better. Workmanship and productivity are improved. Safety colors on overhead cranes and other material-handling equipment, as well as in hazard areas, lessen danger of time-loss accidents.

"Our workers are so proud of their improved surroundings they help to keep work areas clean."

Test the effectiveness of COLOR DYNAMICS in your plant. Use it in a department, or on a machine or two, and see the difference it makes. You'll find it costs no more than conventional maintenance painting.

How you can get a modern color plan of your plant—FREE!

• We'll be glad to send you a free copy of our fully illustrated book on COLOR DYNAMICS for industry. It explains this modern painting system simply and clearly. Better still, we'll be glad to prepare a comprehensive color plan of your factory, without cost or obligation. Call your nearest Pittsburgh Plate Glass Company branch and arrange to have a representative see you. Or mail coupon at right.

[redacted]

Pittsburgh Plate Glass Co., Paint Div.,
Department F-80, Pittsburgh 22, Pa.

☐ Please send me a FREE copy of your booklet "COLOR DYNAMICS."

☐ Please have your representative call for a COLOR DYNAMICS survey without obligation on our part.

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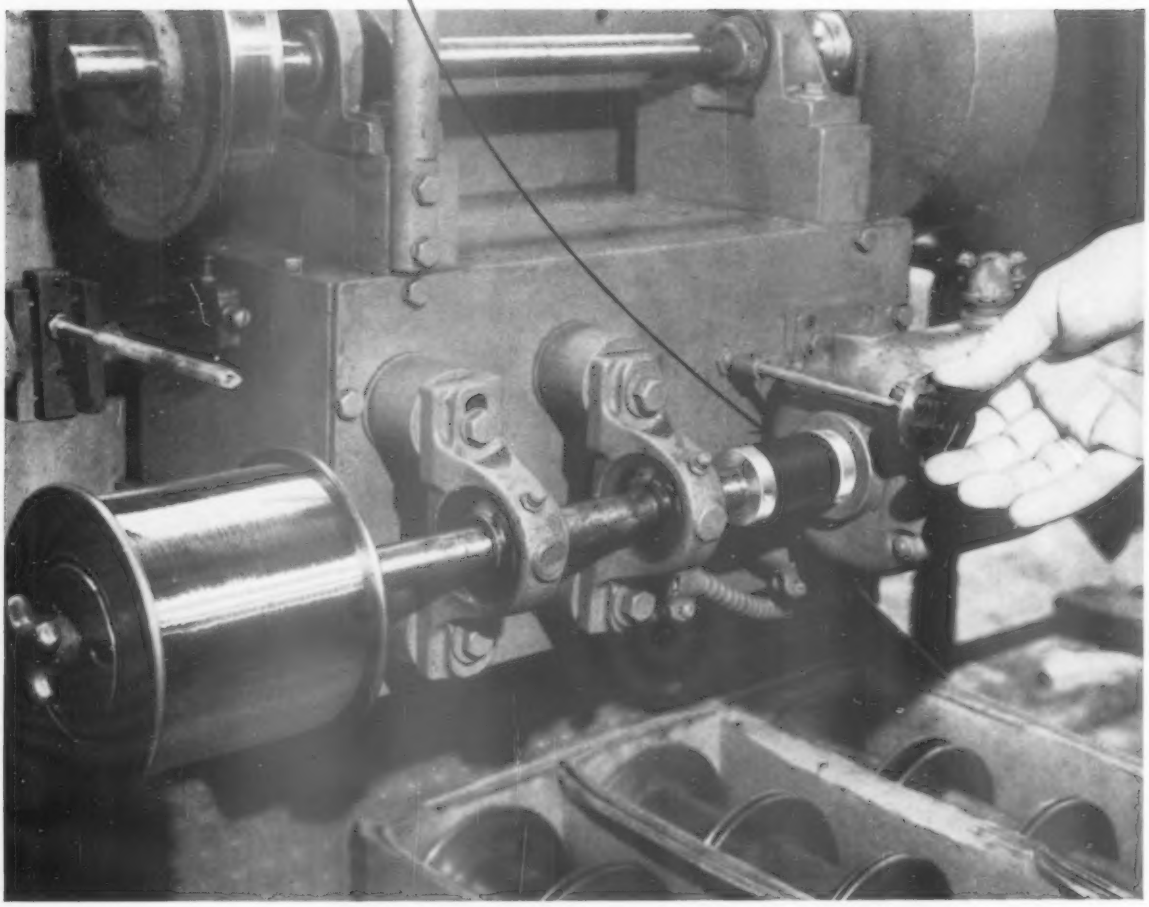

Compensating for misalignment in Viking Wire Co., Inc.

Wire drawing subjects machines to considerable shock loads. The Viking Wire Co., Inc. has a battery of 26 machines in the drawing room. This is one of the newest plants in the industry and has the latest in machinery, equipment and methods.

"U.S." Flexible Couplings were selected for all the machines (see picture) principally to absorb shock loads and compensate for misalignment. Other reasons for selection were ease of installation, lack of maintenance or lubrication and just plain overall efficiency.

These couplings are so simple in design that the cost is very low compared with other couplings. Insist on having these tried on your machinery—and then watch your costs go down.

One sure way to get expert transmission engineering is through your U. S. Rubber Transmission Distributor.

Mechanical Goods Division

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Your productivity is his business

This man specializes in cutting seconds from the time it takes to insert a screw or tighten a nut on the modern assembly line. He knows that bits of time and money saved—multiplied by production volume—result in increased productivity.

He's the Gardner-Denver Application Specialist—a good right hand to tool engineers and methods engineers. He starts with a single air motor, for example, and using a variety of handles, reduction gears, clutches and attachments as "building blocks," he assembles any one of 1173 specific air tools. Each Gardner-Denver air tool—screw driver, nut setter, drill or wrench—is engineered to solve a specific production problem for you. Call your Gardner-Denver Air Tool Specialist for a survey of your production lines. Remember: your productivity is his business.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

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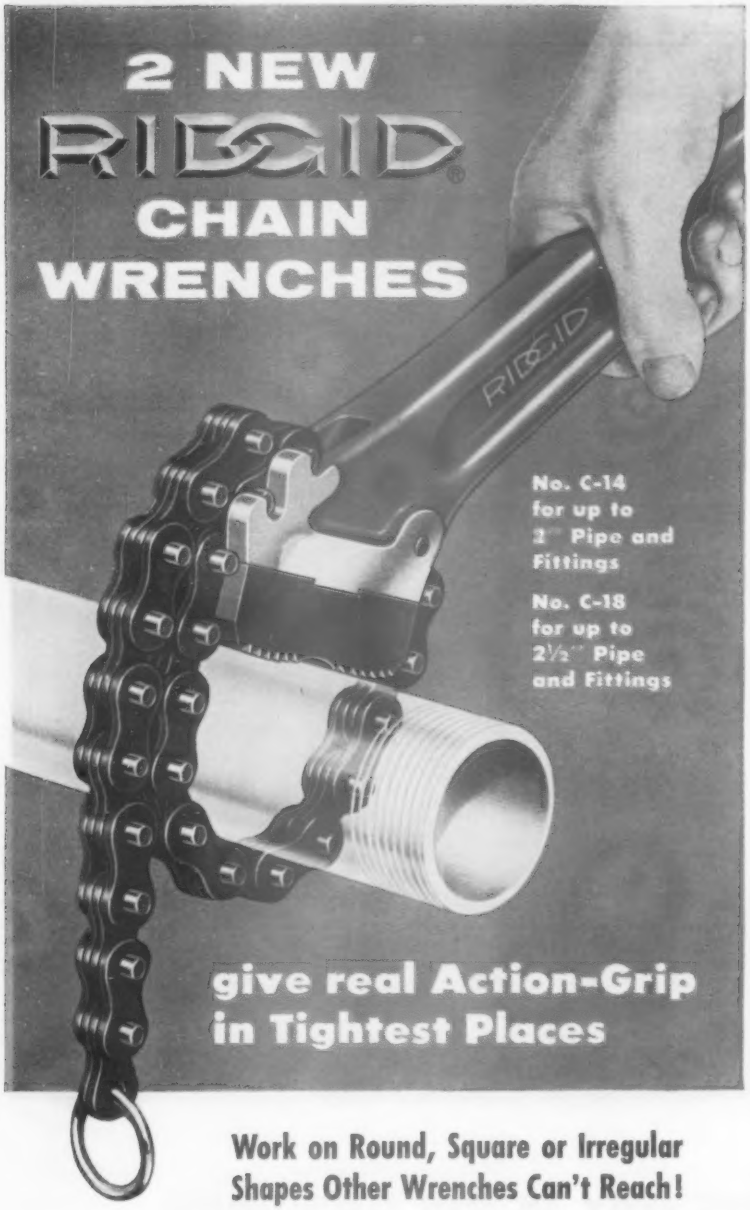


Work on Round, Square or Irregular Shapes Other Wrenches Can't Reach!

In extra close quarters, there's nothing that'll beat these new RIDGID Chain Wrenches for getting the job done. Fast, ratchet-like action in either direction . . . from either side. Give tight grip without crushing. Large, easy-to-grab end ring for fast chain adjustment. Tempered steel chain locks securely . . . releases quickly. Rugged, comfort-grip, I-beam handle, guaranteed not to break or warp . . . handy hang-up hole.

Light and easy to use, these new RIDGID Chain Wrenches do everything a regular wrench can do . . . and much more. Call your Supply House and get one today!

RIDGID

The Ridge Tool Company, Elyria, Ohio, U.S.A.

Begins on page 182

In 1958 the duties of a supervisory employee of the Standard Oil Company (Ind.) were eliminated. The incumbent was bumped back into the unit from whence he came some 15 years earlier—1943. The union objected because at the time one employee was on layoff and another employee was laid off shortly after the bump back.

The arbitrator who heard this case granted the supervisor seniority back to the date of hire in 1939. But this result is not a certainty for other cases. Specific language in the contract covering the situation (if you can get the union to go along with it) may encourage rank and filers to accept promotion to supervisory ranks.

Who's "professional"?

What is a professional employee? Is it his job or his qualifications that determine?

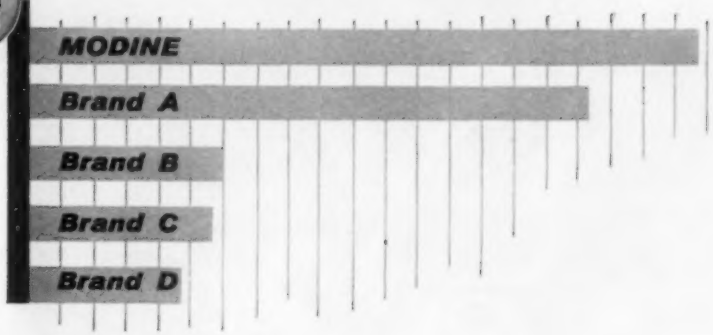
This happens too often: When a professional employee seeks a raise or special treatment, the company says he is a rank and filer. But when the rank-and-file union later on claims him as a member, management may argue he is a professional employee.

Under the National Labor Relations Act, professional and rank-and-file employees cannot mix in the same bargaining unit unless a majority of the professionals vote for inclusion. If they vote no, they're entitled to a separate unit.

In a dispute between the Western Electric Company and the Council of Western Electric Professional Employees, the NLRB pointed out that the law defines a professional employee in terms of the work he performs. It's the work he does and not his individual qualifications that count. However, the background of individuals within a disputed group has often to be considered to decide whether the work of the group satisfies "the knowledge of an advanced type" test of the law.

The law says a professional employee is one engaged in work (1) predominantly intellectual and varied as contrasted to routine mental, manual, mechanical, or physical

Leading the field!



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steam and hot water unit heaters

HORIZONTAL
Can be direct-from-pipe suspended . . . without other supports. Vertical louvers may be added for complete directional control. 24 sizes.

VERTICAL
Available in 28 sizes . . . choice of 4 air deflectors. Depending upon size selected, mounting height may vary from 10 to 60 feet.

POWER-THROW®
For hard-to-heat locations. High-velocity discharge assures exceptionally long heat-throw . . . up to 140 feet. Offered in 10 sizes.

The chart shows the results of a brand preference survey made by a leading industrial magazine. In a poll of *men who buy* steam and hot water unit heaters, Modine finished well out in front.

Since the 1920's, Modine has been the industry pace-setter . . . in performance, styling, economy. Features of today's Modine line include: three distinct designs . . . horizontal, vertical, Power-Throw; lightweight, yet extremely durable construction; high capacity on steam *or hot water* systems; die-formed casings; a complete line of low-outlet-temperature models for high pressure systems; extra-heavy die-formed fins for added strength and maximum heat transfer; vertical fin design that discourages accumulation of dust and dirt.

CATALOG 158 *has complete information. See your distributor or write Modine Manufacturing Co., 1505 DeKoven Ave., Racine, Wisconsin.*

Immediate delivery from local stock! Modine wholesalers are located in all principal cities. Call the Modjne representative nearest you . . . he's listed in the yellow pages.

SU-1389

Also from the world's most complete unit heating line

Modine
FIRST NAME IN UNIT HEATING

There's a job-proved PAYLOADER®

for that extra-high-lift job

When you want to load high gondola cars, feed high bins and hoppers or build higher stockpiles several "PAYLOADER" sizes with extra-long boom arms are available from which to choose. These special tractor-shovels provide dumping heights up to 15 feet and operating capacities up to 12,000 pounds.

Many materials-handling jobs formerly "beyond the reach" of tractor-shovels are now being accomplished by these special "PAYLOADER" units at substantial savings in time and costs over former methods.

A Size to fit your need: Whatever your tractor-shovel requirements there are 8 sizes and 20 "PAYLOADER" models (2,000 to 12,000 lb. operating capacity) for every material handling need — indoors or out. There is a Hough Distributor near you with parts stock and shop and field service backed by factory service personnel to keep your "PAYLOADER" investment profitable.

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8-8-6

Begins on page 182

work; (2) involving the consistent exercise of discretion and judgment —the results of which cannot be standardized in relation to a given period of time. The work must also require knowledge of an advanced type in a field of science or learning customarily acquired by a prolonged course of study. This is distinguished from a general academic education, from an apprenticeship, or from training in the performance of routine mental, manual, or physical processes.

The law goes on to say that any employee who has completed courses of study meeting the advanced knowledge test, and who performs related work under the supervision of a professional person to qualify himself as a professional, is considered one for the purposes of unit determination.

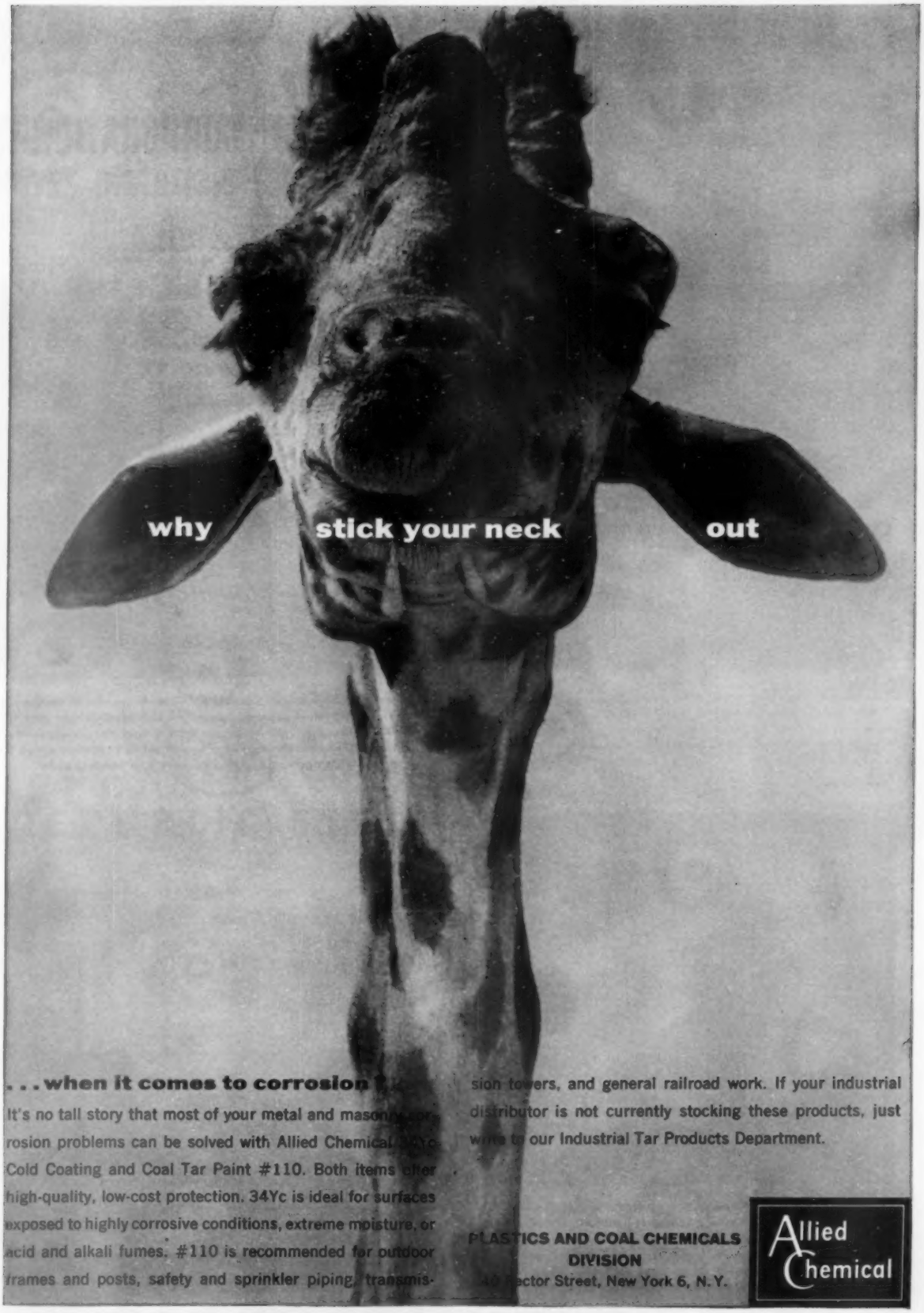
Insurance benefits

As far as the NLRB is concerned, it doesn't matter whether an insurance plan is contributory or non-contributory. In both cases, the company must furnish premium costs to the union whenever it is requested to do so.

An NLRB trial examiner said no obligation to furnish premium data existed when the plan was non-contributory—but he was overruled by the Board. The examiner had the idea that costs assessed against an employee under a contributory plan are deductible from the employee's paycheck and are thus directly related to wages. Costs of a non-contributory plan, he said, have no more direct relation to wages than other operating costs to which employees do not contribute; therefore premium data need not be supplied.

The employer's victory and the trial examiner's opinion didn't get very far. The Board refused to go along with such a distinction. Said the Board: "The term 'wages' . . . has been held to comprehend the emoluments of value which may accrue to employees out of the employment relationship." This would apply to insurance benefits paid entirely by the company.

For more facts Circle 481 on Reader Service Card



. . . when it comes to corrosion

It's no tall story that most of your metal and masonry corrosion problems can be solved with Allied Chemical 34Yc Cold Coating and Coal Tar Paint #110. Both items offer high-quality, low-cost protection. 34Yc is ideal for surfaces exposed to highly corrosive conditions, extreme moisture, or acid and alkali fumes. #110 is recommended for outdoor frames and posts, safety and sprinkler piping, transmission towers, and general railroad work. If your industrial distributor is not currently stocking these products, just write to our Industrial Tar Products Department.

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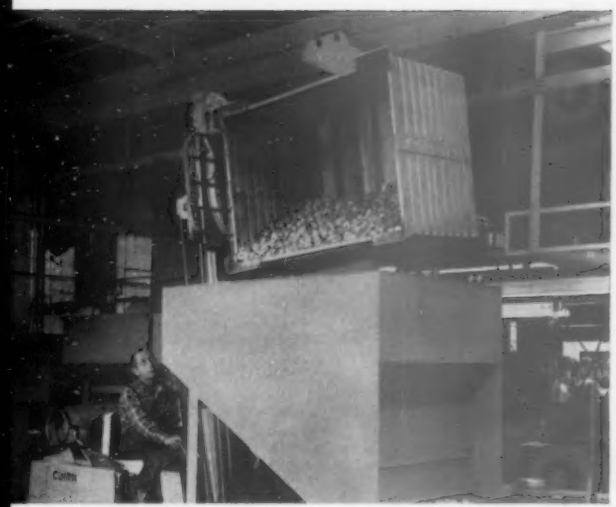
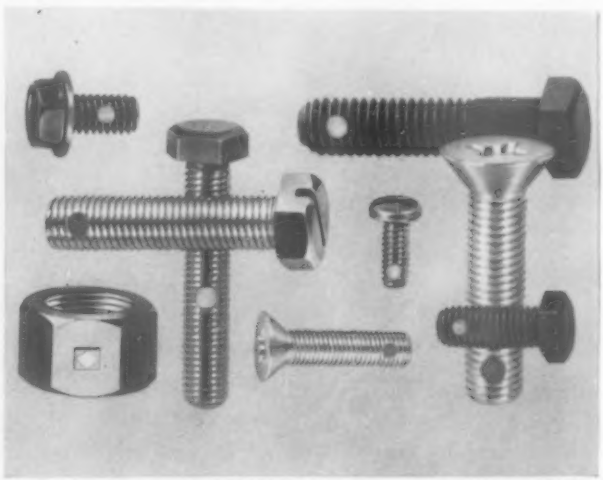
Whirlpool CORPORATION...



The Republic Roll-Over boxes have channel shaped legs which enable narrow forks to enter the legs, lift the unit, roll it over to hopperize the load, and then return the unit to a normal upright position. The boxes also have 8-way fork entry which facilitates narrow aisle handling.

The unique design of these special Republic Roll-Over Boxes permits nesting four high in trailers for inter-plant shipment. Special stacking brackets hold each Unit in place, eliminate sliding from side-to-side, or front-to-back, for greater safety in shipping and storing, and permit stacking eight high safely in storage areas. The results are savings in storage space, production time, and handling costs.

TRUSCON 24" FERROBORD FORMS FOR CONCRETE SLABS save time and money. Economical because it eliminates both cost of materials for temporary shoring, and time for erection and removal. Long spans eliminate close supporting beams, reducing costs for structural supports. And 24" FERROBORD covers more roof area faster. To learn more about Truscon 24" FERROBORD, send for Brochure K-132.



REPUBLIC NYLOK SELF-LOCKING FASTENERS provide a single-unit answer to vibration, shock, tension. A permanent nylon insert forces mating threads together for maximum holding power in any position. The relatively inert nylon resists age, moisture—is unaffected by temperatures from —70°F. to —250°F. Its natural resiliency permits easy adjustment and repeated use. If you have a fastener problem, call your Republic representative, or write today.

For more facts circle these numbers: 483 Roll-Over boxes, 484 Ferrobord, 485 Nylok Fasteners, 486 Metal Lumber.

leading appliance manufacturer moves materials faster, easier, safer...with

REPUBLIC ROLL-OVER BOXES

Republic Roll-Over Boxes are used in moving materials to assembly lines in keeping production humming at Whirlpool Corporation, St. Joseph, Michigan.

These Units were designed and engineered by Andy Thomas of the Whirlpool Corporation, in conjunction with Republic material handling specialists, and Carl Thorkelson of Thornel Associates, containerization specialists representing Republic with offices at Chicago, Illinois.

This is a typical example of how Republic material handling specialists and representatives work with industries, big and small, in recommending proper Republic Units to save production time and costs.

Call your Republic representative or write direct for this expert service. Use the convenient coupon below.

REPUBLIC STEEL

World's Widest Range of Standard Steels and Steel Products

The Whirlpool Corporation, a leading manufacturer of appliances for the home, has ordered 3000 of these special Republic Roll-Over Boxes. Republic material handling specialists will work with you in recommending standard units or in designing special units to move materials faster, easier, safer. Call your Republic representative, or write direct.

REPUBLIC METAL LUMBER is a versatile building product of 1000 and 1 uses. Faster, safer, stronger framing in any application where common building products are now used. Simply measure, cut, assemble. Engineered slotted angle pattern speeds erection, reduces time and material costs. Solves hard to stock storage problems. Bonderized. Available in two gages, two widths, in standard bundles of 10- or 12-foot lengths. Send for attractive brochure.

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Please send more information on the following products:

- ☐ Republic Material Handling Units ☐ Roll-Over Boxes
- ☐ Please have a Republic representative call
- ☐ Truscon 24" FERROBORD®—Brochure—K-132
- ☐ Republic NYLOK® Fasteners
- ☐ Republic METAL LUMBER®

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Driving screws to any depth, at any angle... Black & Decker Scrugun® Screwdrivers do the job best, fastest, with B&D accessories.

Magnetic bit tips

You'll find B&D's complete line of tools has over 3,000 B&D accessories to do any job best . . . everything from magnetic screw tips for Scruguns® to pads for portable polishers.

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Your local B&D distributor has them all. Give him a call.

Socket wrenches and shanks

Black & Decker® ACCESSORIES DESIGNED FOR THE TOOL

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

PRODUCTION

1—Automation Equipment. This 6-pager describes design and operation of TransfeRobot, a precise, automatic parts assembler, machine operator, and production "hand." Lists applications. *USI Robodyne Div., U. S. Industries, Inc.*

2—Portable Power Tools. Specifications and other information on hammers and drills, vibrators, and vibrating concrete floats are given in 12-page catalog (P.O. No. 2235). Includes many application photos. *Syntron Co.*

3—Drilling Machines. Here's a 4-pager that tells about new model drilling machines. A feature of each machine is tape control for numerically controlled production. Specifications, dimensional, other data. *Lahr Machine & Tool Corp.*

4—Filler Metal Selection Chart. This folder becomes a chart that's a new welding aid for specifying correct filler alloys for all recommended wrought-alloy parent metal combinations. Lists characteristics on which filler alloys are rated. *Aluminum Co. of America.*

5—Grinding Wheels. "Grinding Wheels for the Welding Trade" is the title of an informative 16-page catalog (No. 1724). Describes each type of wheel and its uses. Tables and photos will help you select correct wheels. *Norton Co.*

6—Welding Equipment. Revised ADC709G (24 pages) covers manual, semi-automatic, automatic Heliwelding equipment. Data on new holders, automatic heads, and a manual outfit for welding light-gage metals. *Air Reduction Sales Co.*

7—Testing Equipment. Engineering facts and specifications for x-ray test units for radiography and fluoroscopy are contained in 12-page Catalog RC-176(3). Gives details on auxiliary equipment. *Philips Electronic Instruments.*

8—Carbide Tools. This 16-pager (No. 59) is a catalog and manual with technical data on precision-made, solid carbide tools. Information about standard and special carbide micro tools. Tables of speeds, sizes. *Precision Carbide Co.*

9—Gyratory Screen. Operating advantages of redesigned stainless steel screen are given in Bulletin 06 B 8446A (6 pages). Screens are for accurate sizing of dry corrosive and/or abrasive materials. *Allis-Chalmers Mfg. Co.*

10—Extruded Rectangles. Bulletin G-50(a) is a revised 4-pager that describes extruded special aluminum bronze rectangles for severe wear and abrasion applications. Sizes, weights, specifications, applications. *Ampco Metal, Inc.*

11—Equipment Leasing. Title of this 8-page booklet is "Leasing Releases Working Capital." It discusses the question of leasing or ownership, describes how leasing programs work and their many advantages. *Acme Associates, Inc.*

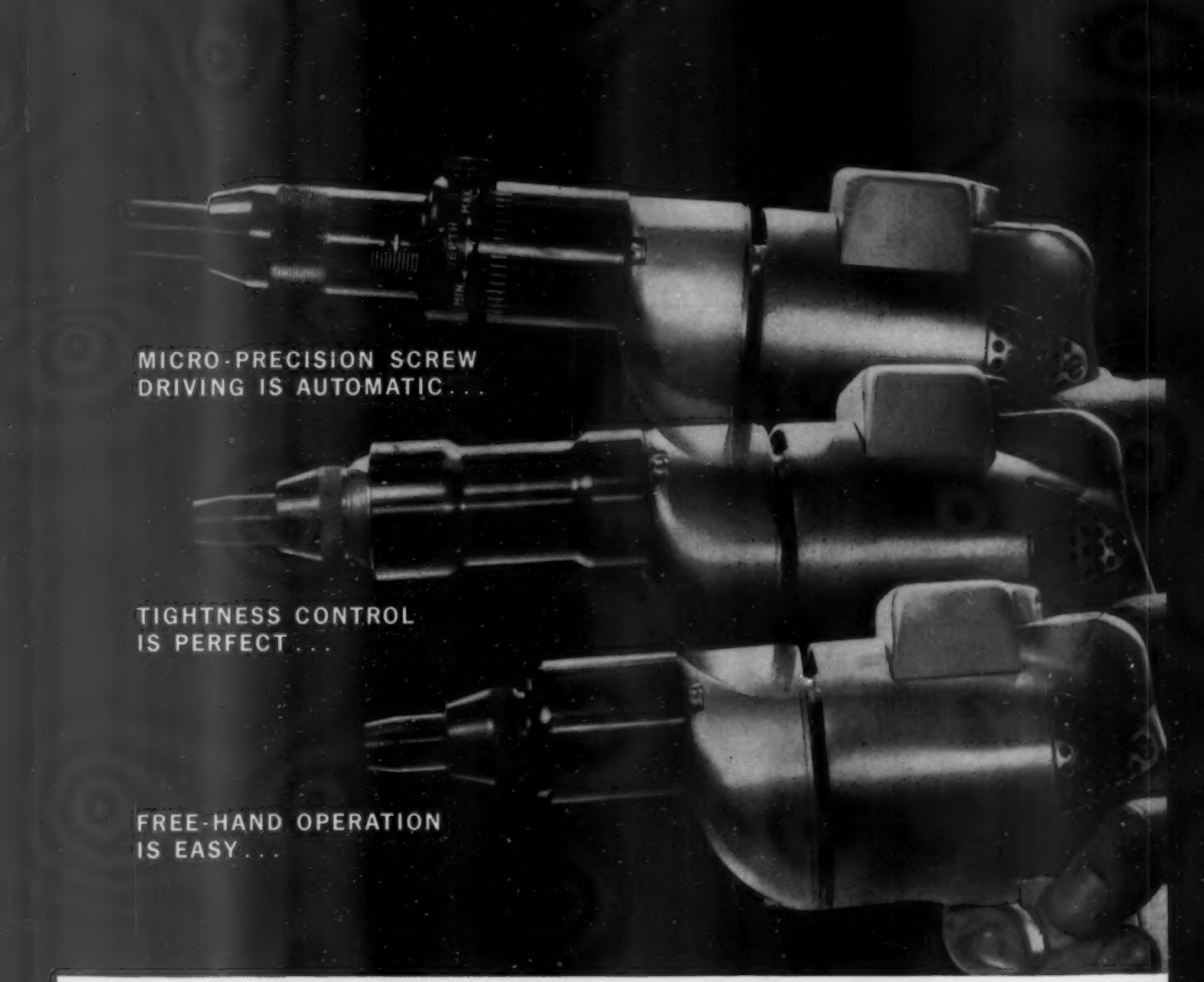
12—Band Mill. Catalog 59-66 is an 8-pager that covers largest of company's Contour-matic band machines. It's designed for machining heavy and large work pieces with a 2-in. high-speed steel saw band. *The DoAll Co.*

BUILDING

13—Partitioners. Movable wall components that fit together easily are described in 16-page catalog (No. 2-60). Panels, posts, and doors are designed to give flexibility in floor layout. In 13 colors. *Rockaway Metal Products Corp.*

14—Facing Tile. Adaptability of colored ceramic glaze structural facing tile for many applications is discussed in Bulletin CC-60 (4 pages). Highlights the 22 standard and 9 accent colors. Color specification chart. *Natco Corp.*

Turn the page



Cut man-hours to minutes... with Black & Decker's Screw Driver Line

If you want to drive screws to a depth set with thousandths-of-an-inch accuracy . . . do it automatically with the B&D Micro-Clutch Scrugun Screw Driver. If you want to drive screws to the right degree of tightness . . . do it perfectly with the B&D Adjustable-Clutch Scrugun® If you want to drive screws free-hand with your personal touch . . . do it easily with the B&D Positive-Clutch Scrugun.

Famous Black & Decker power makes any job with every Scrugun easier yet. Scruguns are reversible, too. Check out the complete B&D line of 17 different screw drivers. NOW . . . see how they are made to stay on the job longer, designed to take pride in your work, always. Buy them at leading distributors everywhere.

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WORLD'S LARGEST MAKER OF POWER TOOLS

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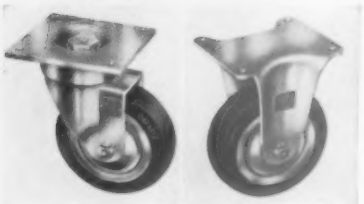

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Of course . . These casters carry the same guarantee against defects in materials and workmanship as all other Darnell products.

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FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

15—Fibrous Glass Panels. Here's a 4-pager (IC-260) that lists information on light transmission panels for skylights and side walls. Alsynite glass is shatterproof, comes in various shapes, colors built in. *Reichhold Chemicals, Inc.*

16—Thermal-Raye Heating. How you can have year-round controlled area warmth, even out of doors, is told in 4-pager (Form No. 60-1). Infra-red rays supply the heat; fixture is suspended from ceiling or mounted on wall. *Thermal-Aire, Inc.*

ELECTRICAL

17—Lighting Equipment. Catalog CTC-4 has 24 pages of information and drawings covering new lighting fixtures, shallow dome reflectors, floodlights, and other products. Lists applications, dimensions, finishes. *Steber Mfg. Co.*

18—Transformers. This 4-pager (SE-L2609) describes motor-driven variable transformers in both open and enclosed construction. Includes outline dimensions, input and output ratings, application details. *The Superior Electric Co.*

19—Circuit Breakers. Design, installation, and applications of rotary-handle circuit breakers are discussed in No. 1425 (8 pages). Includes breakers from 15 to 800 amp. *Federal Pacific Electric Co.*

20—Clutches, Brakes. Over 20 types of fixed field, miniature, small and large clutches and brakes are covered in this 6-page catalog. Chart shows reaction times for static and pick-up torque relations. *Simplatrol Products Corp.*

21—Bus Ducts. Here's an application data bulletin (No. 30-660, 12 pages) on plug-in, low-impedance, high-frequency, and electric-utility bus ducts. Design features, test data, cost comparison, etc. *Westinghouse Electric Corp.*

Turn the page

NEW SOURCES OF SUPPLY — WHERE?

ASK THE MAN FROM THE NORTHERN PLAINS

When you need parts, processing, assemblies, we can locate new sources for you. Northern Natural Gas Company, Omaha, Nebr., has catalogued for instant reference by electronic methods, information about the production capacity of thousands of plants in the Northern Plains. This detailed information has been gathered and tabulated by the private gas utilities of the area. Upon receipt of details regarding your requirements, we will be glad to suggest possible qualified suppliers located in the five state Northern Plains Area.

For Accurate Information about the Manufacturing Facilities available in the Northern Plains, write Randall Klemme, Vice Pres., Northern Natural Gas Company, Omaha, Nebraska, or call Webster 7600.

This Unique Service Is Yours . . . Simply For The Asking

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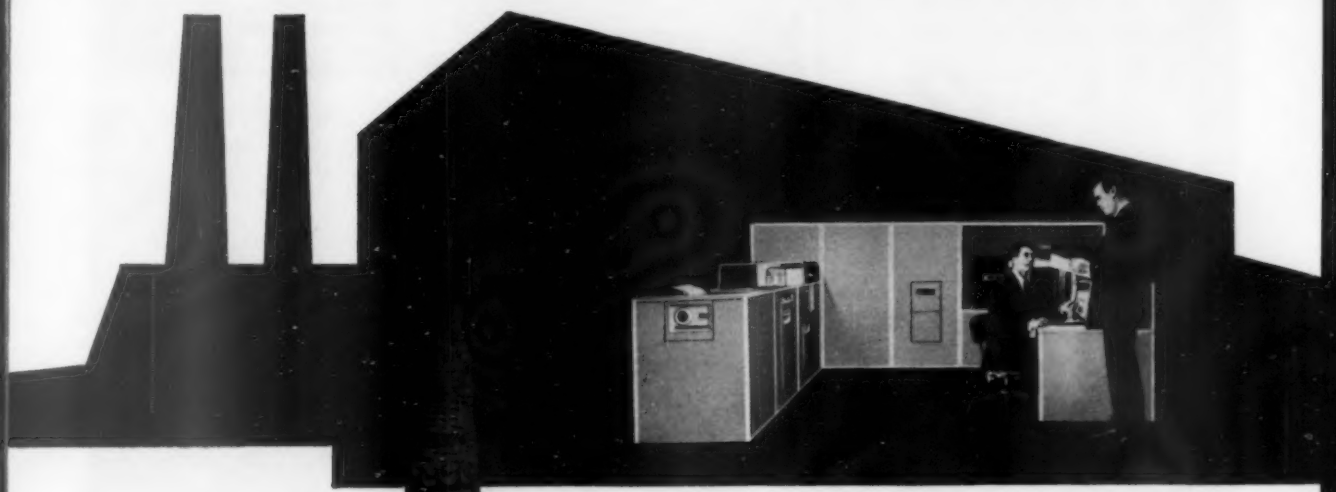
one late decision on inventory and this $50 part could cost you $5,000



IBM RAMAC® 305

controls inventory data to prevent costly "out-of-stock" conditions

A delay in production caused by an "out-of-stock" part can make that part the most expensive item in your stock. IBM RAMAC 305 gives you the fast and accurate control over inventory that helps you avoid costly shortages—or equally costly overstocking.

As each transaction is entered into RAMAC, all affected records are immediately posted and updated. Management may inquire as to the status of any specified item in inventory. This random access ability is an exclusive feature of the IBM RAMAC.

Balanced Data Processing . . . IBM services as well as machines . . . is a continuing responsibility of IBM to its customers. Like all IBM data processing equipment, RAMAC 305 may be purchased or leased.

IBM®

balanced data processing

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VALDURA DURAWEAR

Higher in Solids—gives higher film build . . . cuts maintenance painting costs

Money-saving Durawear not only has top color and gloss retention, it gives extra protection to surfaces for many years. Featuring a linseed oil modified alkyd vehicle, Durawear has better brushability than straight alkyd enamels. It is very easy to paint on irregular surfaces since the consistency prevents running off from sharp corners. Use Valdura Durawear on steel, wood or masonry—indoors or out—as illustrated above, on fire escapes, wall surfaces, storage tanks, and wherever protection from elements of weather is desired. Available in five attractive colors.

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PAINTS THAT ENDURE

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FACTORY / CATALOG NEWS

Begins on page 198

For more about these items, circle item numbers on Reader Service Card next to back cover.

22—Floodlights. Bulletin GEA-7201 (10 pages) outlines usefulness of floodlighting loading platforms and other areas. Application and product information on filament, mercury vapor, and fluorescent units. *General Electric Co.*

23—Drives. This 4-pager (No. 101) describes electronic Select-A-Spede drives in sizes from ¾ to 4 hp. For use on machine tools, conveyors, pumps, test equipment, etc. *The Louis Allis Co.*

24—Switches. Design features and operating characteristics of precision snap-action switches are given in 16-pager (Form 560). Includes definitions of technical terms, diagrams of switches, and photos. *Cherry Electrical Products Corp.*

25—Motors. Multi-shielded a-c motors, shielded five ways, are described in comprehensive 56-pager (No. 200). Gives dimensional data for ¼-hp to 200-hp. motors; selection, application, and other details. *Sterling Electric Motors, Inc.*

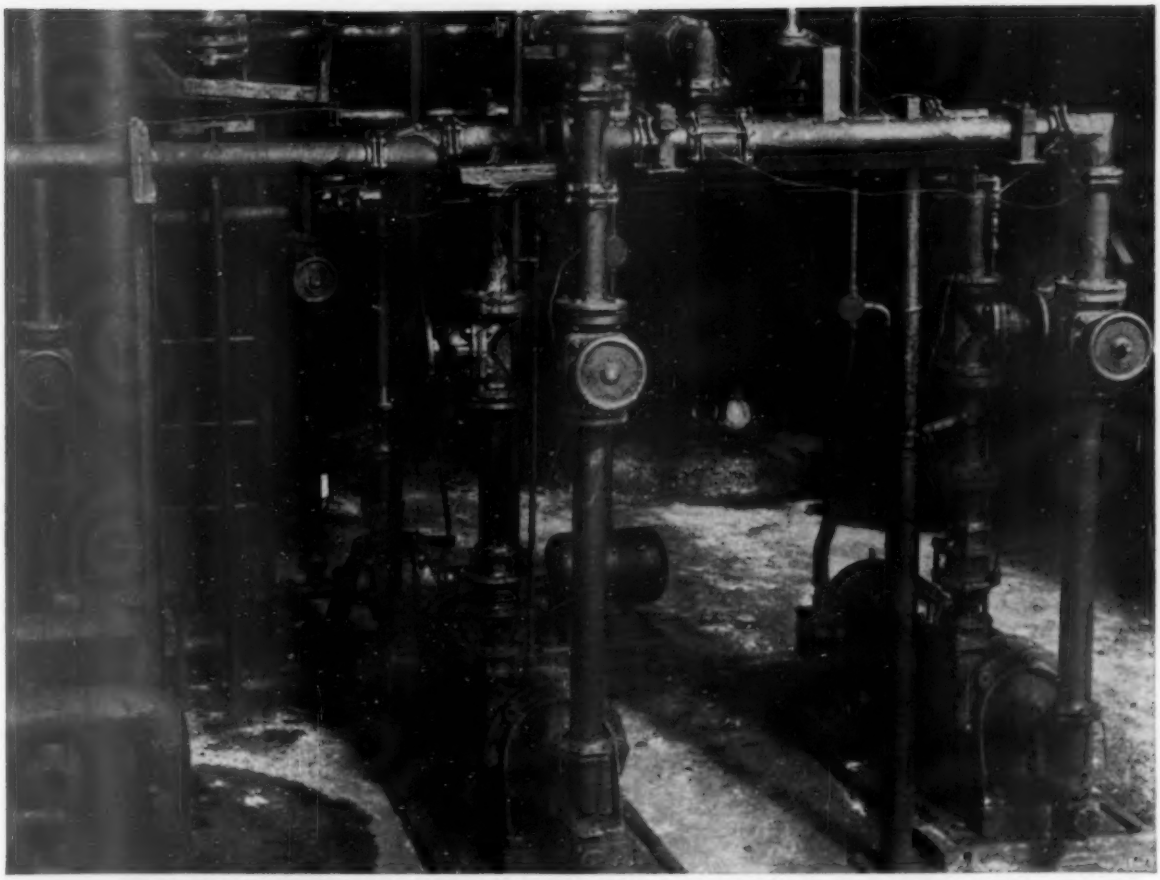
AUXILIARY

26—Centrifugal Fans. Catalog No. 1120-1 (76 pages) describes all-purpose Series 3000 fans. Applications include air conditioning, ventilating, supply and exhaust, etc. Tables of performance data. *Westinghouse Sturtevant Div.*

27—Water Heaters. Design and construction features of gas-fired water heaters are explained in 4-page folder (AIA. 29-D-2). Gives specifications for nine models ranging in input Btu./hr. from 180,000 to 1,800,000. *Commercial Heaters Co.*

28—Air and Vacuum Pumps. Catalog 460 (32 pages) discusses rotary positive air pressure and high vacuum pumps, gas boosters, air motors. Information on 2- and 4-vane types, single- and double-cylinder motors, etc. *Leiman Bros.*

Turn the page



Glass-lined Grinnell-Saunders Valves, with Teflon Diaphragms, on benzene hexachloride lines at Diamond Alkali's Greens Bayou, Texas, plant. Hundreds of other Grinnell Diaphragm Valves are used in other areas of the plant.

How a manufacturer of benzene hexachloride solved a serious valve leakage problem

Valving at Diamond Alkali's Greens Bayou, Texas, plant had become expensive. Leakage of a product containing 30% to 40% benzene and free chlorine released fumes and caused rapid corrosion of the metal parts of the valves used previously, as well as of adjacent equipment.

This problem was corrected when Grinnell-Saunders Diaphragm Valves were used. The first replacement of any part of the Grinnell Valves did not occur for two years, and this was the diaphragm *only*. The former valves had to be *completely* replaced every one to two months! Bodies of the Grinnell valves lasted four years. In short, when Grinnell-Saunders Diaphragm Valves were installed, stem leaks ceased; corrosion was eliminated; and downtime to install new valves was practically ended.

For further facts about Grinnell-Saunders Valves, see Grinnell's insert in Chemical Engineering Catalog, or Sweet's Plant Engineering File — or write directly to Grinnell Company, Providence 1, Rhode Island.

- Diaphragm lifts high for streamline flow in either direction
- Diaphragm presses tightly to effect positive closure
- No packing glands to need attention
- Diaphragm easily replaced without removing valve body from the line
- Wide choice of body, lining and diaphragm materials

GRINNELL-SAUNDERS DIAPHRAGM VALVES

GRINNELL COMPANY, PROVIDENCE 1, R. I. • BRANCH WAREHOUSES AND DISTRIBUTORS FROM COAST TO COAST
PIPE FITTINGS • VALVES • PIPE HANGERS • PREFABRICATED PIPING • UNIT HEATERS • PIPING SPECIALTIES

For more facts Circle 492 on Reader Service Card

Here you see 9 of 16 Toledos that guard quality at weighing points in the Drug and Chemical Department of Parke, Davis & Company in Detroit. Toledo Bench, Portable and Laboratory Fan Scales do pre-batch weighing . . . then ingredients move on for final mixing and blending.

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meet PARKE, DAVIS & COMPANY'S *Critical Standards . . .*

Parke, Davis & Company brings to doctors and patients wonders in the world of medicine . . . products that help extend the span of human life . . . alleviate suffering . . . and thwart sickness and disease. It's a 94-year tradition at Parke, Davis & Company to keep going forward — in research and in methods and equipment used in their laboratories.

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Let us show you how modern Toledos will fit your needs equally well — whatever your weighing problem. Write today for new Condensed Catalog 2001.

● Toledo Model 2282 Suspended Platform Scale weighs drug materials going into batches in the Crude Drug Milling Section of the Extract Department.

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Headquarters for Weighing Systems

FACTORY / CATALOG NEWS

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For more about these items, circle item numbers on Reader Service Card next to back cover.

29—Infra-Red Heaters. This 4-pager (CS-300) presents design data, control arrangements, and advantages of infra-red heating. Has tables of mounting heights for different models, recommended clearances from combustibles. *Hupp Corp.*

30—Fans. Construction features and application details for new line of BT and BTV belt-driven tube-axial fans are described in Bulletin 625 (8 pages). Includes ventilating system designs, photos, drawings.

31—Waste Handling Pumps. Here's a 4-pager (No. 2305) that tells about 11 types of pumping equipment for handling waste material in all forms. Comprehensive selector chart helps you match pump to waste material. *Yeomans Bros. Co.*

32—Rotary Pumps. Catalog (16 pages) has easy-to-understand technical data on rotary pump selection. Liquids are grouped into eight classifications according to viscosity; pump selection table is given for each. *The Deming Co.*

MATERIAL HANDLING

33—Conveyors. How four types of mechanical vibrating conveyors meet a full range of applications is set forth in Catalog No. 954 (64 pages). Details cover operation, dimensions, selection chart, accessories. *The Jeffrey Mfg. Co.*

34—Slings. Easy-to-read 4-pager (DH-425) covers strand-laid wire rope slings said to be strongest in world. Construction details, advantages, rated capacities. *American Chain & Cable Co., Inc.*

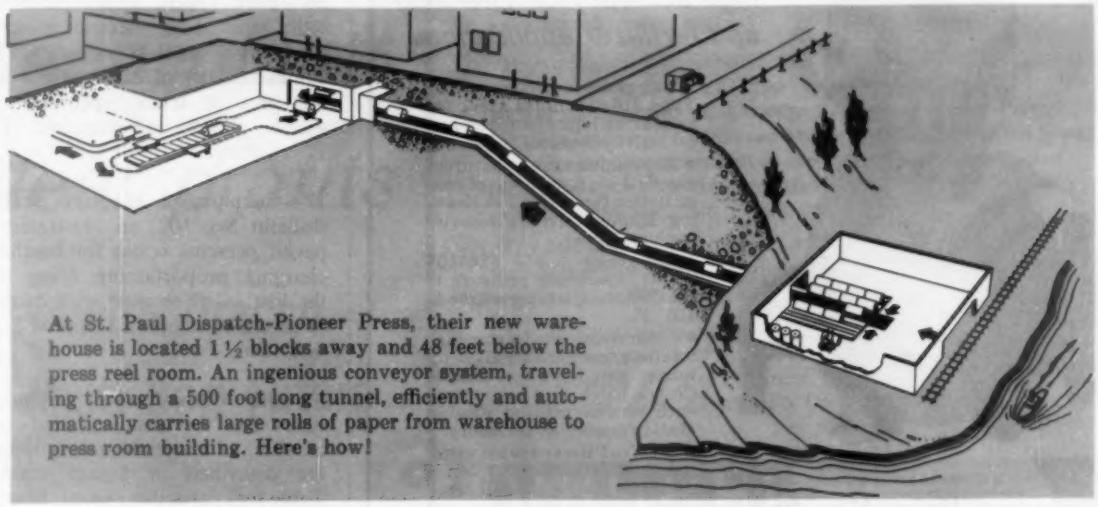
35—Lifting Attachments. Catalog L-460 describes attachments for cranes and hoists for use with pallets, unitized loads, coils, and concrete pipe. Includes information about "Bartender" racks and spreaders. *Cady Metal Fabricating Inc.*

Turn the page

For more facts Circle 493 on Reader Service Card

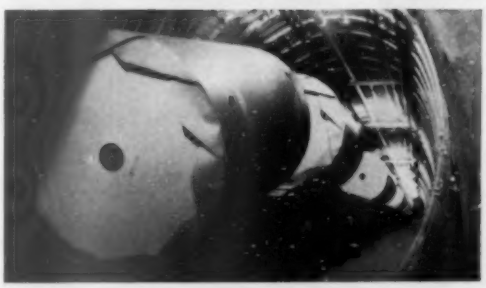
For more facts Circle 494 on Reader Service Card ▶

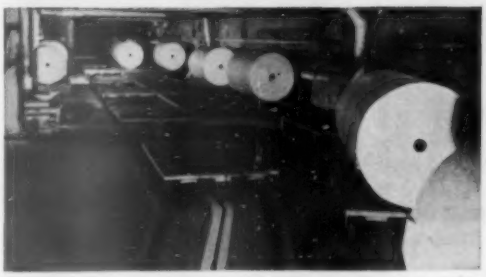
This Webb automatic conveyor system hustles newsprint thru 500 foot tunnel



At St. Paul Dispatch-Pioneer Press, their new warehouse is located 1½ blocks away and 48 feet below the press reel room. An ingenious conveyor system, traveling through a 500 foot long tunnel, efficiently and automatically carries large rolls of paper from warehouse to press room building. Here's how!

ROLLS REALLY KEEP ROLLING





1. At warehouse, the newsprint rolls (60" long x 36" in diameter and weighing 1500 lbs.) are removed from railroad cars by lift trucks and stacked for storage or placed on the tunnel conveyor for current use. Systematic loading of conveyor is accomplished by two sets of kicker plates which operate in series to propel four rolls at a time into spaced positions on the conveyor. Kicker plates are actuated by bumper switches and air pressure.

2. Tunnel conveyor is divided into four individually powered sections which can be operated "continuous-run" or separately for programming. The ascending section is built on a 15-degree incline and its slats are rubber coated to preclude slipping of load. A continuous live-supply of rolls (spaced 18 inches apart) is maintained by means of electric eye controls at beginning and end of each section.

3. When rolls reach the press room basement, they are automatically pushed off the tunnel conveyor and onto Towveyor trucks. Thirty-one of these trucks are attached to a moving chain loop in the floor to provide additional live-storage of rolls. In the reel room area, a semi-automatic "kick-off" pushes the rolls from the Towveyor trucks onto press room trucks as needed.

System capacity is 130 rolls, manual handling is eliminated, live and stationary storage is provided, and high efficiency is assured by the soundly engineered solution of this unusual material handling problem.

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Badger's 2" stainless steel meter with magnetic drive...

high accuracy on chemical and fertilizer applications

- Ruggedly constructed of Type 316 stainless steel for measuring liquid fertilizer and corrosive chemical solutions.
- Key maintenance features: simple design, take apart construction for easy, quick cleaning. Magnetic drive eliminates packing gland.
- Accuracy ±.5% (20-100 GPM), operating pressure to 150 PSI, and temperatures to 150° F.
- Order with low-cost standard totalizer, combined gallon totalizer and reset totalizer or electric batch. Can be equipped with remote reading Read-o-Matic register as accessory.
- *Typical uses:* measuring, blending, batching of liquid corrosive chemicals and fertilizers in manufacturing and bulk plant operations.

Write for descriptive literature

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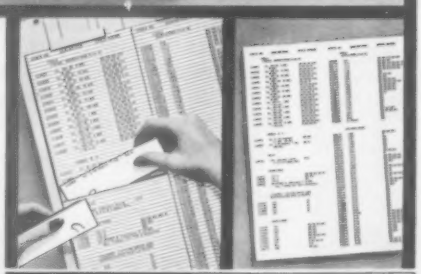

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FACTORY / CATALOG NEWS

Begins on page 198

For more about these items, circle item numbers on Reader Service Card next to back cover.

36—Fork Truck. This 4-pager (B-628) tells about electric powered truck with 7000-lb. capacity. Includes analysis of each main working part of truck, specifications, speeds, photos, and diagrams. *The Elwell-Parker Electric Co.*

37—Suspension Hopper Scales. Bulletin No. 102, an illustrated 6-pager, presents scales for batching, charging, proportioning, filling, and the like. Can be used with existing or proposed hoppers. *Cardinal Scale Mfg. Co.*

38—Jib Cranes. Eight standard types for low-cost, efficient spot handling of materials and equipment are described in 8-page catalog. Table lists capacities, spans, heights, girder sizes, and other information. *Abell-Howe Co.*

39—Conveyor Lubricator. Here's a 4-page brochure with details about new floor-type heavy-duty lubricator that automatically injects oil or grease in wheel bearings of trucks, dollies, and pallets used with conveyors. *Olsen Mfg. Co.*

40—Material-Handling Equipment. Products covered in this 68-page catalog (No. 605) include vibrators, car shakers, packers, jolters, feeders, conveyors, vibrating screens, and the like. Specifications. *Syntron Co.*

MECHANICAL

41—Wedge Drive. Catalog Section 125 (28 pages) is an engineering and specification guide covering new compact Hi-Cap wedge belt drives. Tables list service factors, horsepower, dimensions, weights. *Fort Worth Steel & Machinery Co.*

42—Pumps. Bulletin No. 203 in 8 pages describes the use of axial piston pumps at pressures up to 5000 psi. Discusses Series 30, 40, and 60 pumps in constant and variable volume models. *American Brake Shoe Co.*

Turn the page

clean plants, clear profits

with Dracco Multi-Bag Filters

Freedom from dust in your plant can mean:

- **lower plant maintenance and cleaning costs**
- **less abrasive wear on machinery**
- **no raw material waste**
- **better working conditions**
- **improved manpower and machine efficiency**
- **no air pollution**
- **guaranteed product purity**

High-efficiency cloth filtration with Multi-Bag Filters can help you clear the way for profits in any or all of these areas. Wide range of standard sizes permits engineering to meet almost any dry collection requirement. Units can be installed in or out of the plant. Operation may be intermittent or continuous, depending on dust loads and degree of automation desired. Long-life filter bags are available in any type cloth, natural or synthetic.

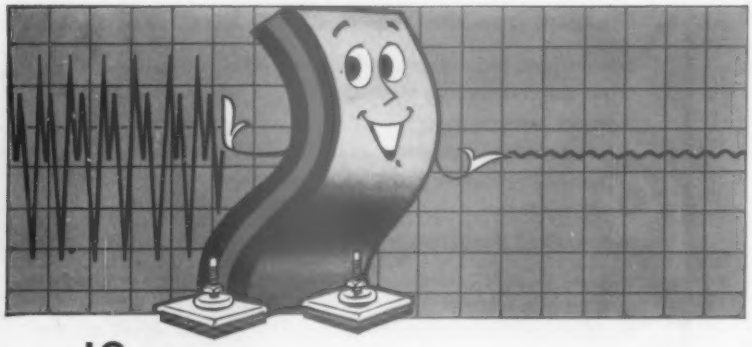
Freedom from maintenance is another benefit that helps you clear extra profits. Simplified, rugged, design with few moving parts keeps Dracco maintenance costs lowest in the industry, year after year.

For full information on Multi-Bag Filters, and other units in Dracco's complete line of dry collection equipment, write: Dracco Division of Fuller Company, Harvard Avenue and East 116th Street, Cleveland 5, Ohio.

DRACCO *airstream* conveyors dust control equipment

SPECIAL COLLECTORS
Dracco is also experienced in design and fabrication of large custom-built collectors, using glass or other synthetic cloth bags, to solve extremely severe or unusual dust problems.

Typical Multi-Bag Filter system at large eastern processing plant shows how standard units can be grouped together to provide unlimited capacities.



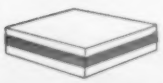
IS

VIBRATION

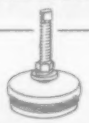
ROBBING YOU BLIND?

Transmitted vibration in your plant or office is a universal culprit that keeps attacking your costs and operating efficiency in a hundred ways . . . unless checked at its source.

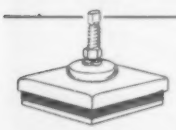
Unisorb machine mounts — either pads or Level-Rite devices — reduce up to 85% of this transmitted vibration and provide a practical, low-cost solution to almost all vibration problems. Unisorb Vibration Control reduces noise, worker fatigue and human inefficiency. Unisorb will reduce maintenance of buildings and machines, cut down-time and simplify machine installation. In addition, tests show that Unisorb permits running machines at higher speeds and closer tolerances for increased production and improved quality.



Unisorb Mounting Pads
Unisorb pads are the basic vibration control unit, identified by the red centers and brand mark. Available in a wide range of densities and thicknesses for proper application. Saves up to 80% in installation time and costs.



Unisorb Level-Rite 200
Unisorb Level-Rite "Junior" has been especially designed for light machines, air conditioners, business machines and similar equipment. A low cost, precision leveling device and vibration control unit, with loading limit of 200 lbs. per unit. Ideal for original equipment.



Unisorb Level-Rite Mount
Unisorb Level-Rite is a universal, self-contained leveling device for all types of machines. Fast, simplified way to achieve and hold precise level. Available with exclusive screw-post design or as a basic mounting plate for use with built-in leveling devices.

Remember — to simplify installation, improve performance and control vibration . . .

UNISORB MOUNTS MAKE THE DIFFERENCE

. . . for all types of machines from laboratory equipment to giant presses.
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FACTORY / CATALOG NEWS

Begins on page 198

For more about these items, circle item numbers on Reader Service Card next to back cover.

43—Boosters. An easy-to-use handbook and engineering guide (No. 116) points out wide range of uses and advantages of air-hydraulic interchangeable boosters. Tables of thrust and pull force, flow data, and the like. *The S-P Mfg. Corp.*

44—Variable Speed Sheave. How sheave provides accurate speed control without freezing or lubrication is explained in revised No. 6102 (8 pages). Tables, photos, diagrams. *T. B. Wood's Sons Co.*

45—Poly-V Drives. Advantages of these belt drives are outlined in 4-page booklet (No. 2343). Gives data on in-operation characteristics of vibration; sheave groove dimensions; speed ratios. *Dayton Industrial Products Co.*

MAINTENANCE

46—Scaffolds. Bulletin No. AS-10 (8 pages) gives details on aluminum ladder, sectional, and folding-type scaffolds. Easy to erect, they come 29 and 54 in. wide, and with 6-, 8-, 10-ft. spans. Photos. *The Patent Scaffolding Co., Inc.*

47—Wash Units, Showers. "Safety . . . on Tap" is a 32-pager (No. 360). It describes emergency eye and face wash units and drench showers that give first-aid protection against chemicals, fire, and metal particles. *Haws Drinking Faucet Co.*

48—Multi-Job Washer. This 4-pager gives details of an all-electric cleaner for machinery, equipment, and parts. It's not a steam cleaner but a machine that combines heat, high pressure, and detergent. *Homestead Valve Mfg. Co.*

49—Key Equipment. A method for filing and controlling keys is presented in 4-pager (18e—Moo). Explains how Telkee system of key control works; shows equipment for various types and sizes of installations. *P. O. Moore, Inc.*

Turn the page

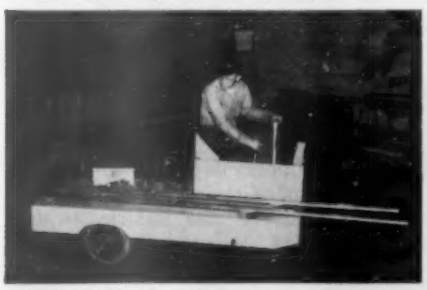
NEW MAINTENANCE IDEAS

Here is the proven practical way to *motorize* maintenance departments

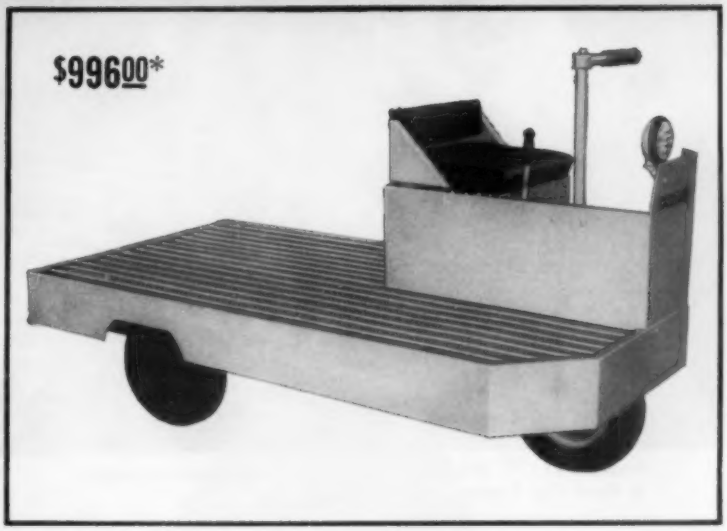
ELECTRICAL — This 18 sq. ft. of deck area carries the man, the material, and the equipment in one operation.

PLANT ENGINEERING — Heavy loads of odd sizes and shapes fit on platform with room for tools to do the job on arrival.

PIPE FITTER — Speed and maneuverability engineered for maintenance functions on widely scattered jobs inside plants and outside yards.



MILLWRIGHT — Ample load capacity for carrying heavy replacement parts such as long heavy shear blades.



Industries switch to labor-saving PRIME-MOVER F-10 and step up maintenance efficiency three ways:

1. Doubles or triples maintenance man's productivity by *transporting* him to the job . . . The most obvious waste of a workman's time is having him walk to widely scattered jobs. An F-10 gets him there at the top speed permissible under normal plant conditions!
2. Lets him carry the needed materials with him . . . The man doesn't have to depend on someone else to bring materials which ties up other equipment. An F-10 hauls pipe, lumber, fixtures, motors, or odd shaped materials!
3. Moves the *workman* and the *equipment* in *one operation* . . . Almost every maintenance job requires tools and equipment to do the job. An F-10 carries hand tools, power tools, ladders, welding equipment, or special tools.

*An F-10 is an industrial truck built for dependable service in industry — and sold by industrial truck distributors. Write today for job data on how this truck, which lists for only $996.00 F.O.B. factory, can be one of the best investments your plant has ever made.

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Gentlemen: Please send me job data on how PRIME-MOVER F-10 performs for maintenance departments that handle these services:

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Powell's unique FLOW-MATIC boxes stack easily and neatly in a minimum of floor space at Steel City Electric Co.

THE POWELL PRESSED STEEL COMPANY
50 ERIE STREET • HUBBARD, OHIO
The most complete line of material handling equipment.

FACTORY / CATALOG NEWS

Begins on page 198

For more about these items, circle item numbers on Reader Service Card next to back cover.

50—First-Aid Kits. No. 0401-10 (4 pages) describes all-weather kits to hold unit-size packages of dressings, etc. Construction details, data on unit sizes and refills. *Mine Safety Appliances Co.*

51—Incentive Awards. The effectiveness of Zippo lighters as reminders in safety programs is outlined in case history booklets. These lighters are also suitable as prizes to employees for work improvement suggestions. *Zippo Mfg. Co.*

INSTRUMENTS AND CONTROLS

52—Pneumatic Instruments. Catalog 515 (12 pages) tells about pressure and temperature pilots and pneumatic transmitters. Describes optional indicating controller and other features. *U. S. Gauge Div., American Machine & Metals, Inc.*

53—Digital Information System. Operation of the Metrotype system using all solid-state components is described and iluustrated in Bulletin E72-2. Lists specifications, applications. *Bailey Meter Co.*

54—Control Systems. This 12-page booklet outlines advantages of company's approach to industrial process control systems. Describes flexibility of typical control system and functions it will perform automatically. *Daystrom, Inc.*

55—Gas and Liquid Controls. Catalog covers more than 2500 components for control of gas or liquid over a temperature range of −320 to 1500 F. and pressures to over 3500 psig. *AiResearch Mfg. Co.*

56—Oscillograph. Here's a 36-page manual of Visicorder applications. It contains 18 case histories (with photos and diagrams) that demonstrate the versatility of the recording system. *Heiland Div., Minneapolis-Honeywell Regulator Co.*

Turn the page

This shop cuts costs by using STANICUT *Oil 137 BCS*

Machines seven metals, one plastic with this one cutting fluid

Shank Manufacturing Company, Chicago, cuts production costs three ways by using STANICUT Oil 137 BCS. (1) The 15 Warner & Swasey Lathes are never down for change of cutting fluid when the metal being worked is changed. There's no time lost with shutting down, cleaning up and changing oil. (2) There are no losses from the use of the wrong cutting fluid. (3) Floor space is used for productive machinery instead of being tied up as storage space for barrels of different cutting fluids.

Titanium, brass, alloy steel, aluminum and seven grades of Stainless plus Teflon plastic are all worked on the machines. Latest equipment, a reputation for good work, experienced operators and on-time delivery keep business coming to Shank. STANICUT Oil 137 BCS helps Shank hold down manufacturing costs.

Does cutting costs with a cutting fluid interest you? Let one of Standard Oil's experienced lubrication specialists show you how STANICUT Oil 137 BCS can do it. Call the Standard Oil office nearest you in any of the 15 Midwest or Rocky Mountain states. Or write **Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.**

You expect more from **STANDARD** *and you get it!*

Frank Kruppe, Shank president (left) shows Hank Krueger of Standard Oil one of the pieces Shank Mfg. produces. Hank Krueger provides Shank plant with technical service on cutting fluids. Hank has the experience for this work. He's been doing it for six years. He has an engineering degree from Illinois Institute of Technology and has completed Standard's Sales Engineering School.

ADAMS

. . . Superior Performance at Lower Prices

Adams Aftercoolers provide superior condensation of pipeline oil and water vapor by reducing gas or air temperature to within 10° of cooling water. This performance, unique in the industry, is made possible by Adams' specialization in these units for over 25 years. During this time, mass-production techniques have developed these superior design features at a lower purchase cost:

12-PASS WATER CIRCULATION — provides maximum heat exchange from tube bundle — cooler discharge air.

FREEDOM FROM OPERATING TROUBLES — full floating rear tube sheet compensates for expansion. Floating tube sheet is machined parallel after rolling to assure long life to packing seal. Packing gland is locked rigidly in place on adjustable studs to isolate pipe line expansion strain, thereby protecting the packing.

ADAMS CYCLONE SEPARATORS have an exclusive cyclone design for maximum extraction of oil laden condensate; their separation efficiency is constant over a wide range of loads — features not found in other separator designs.

WRITE TODAY for Bulletin 714 for the engineering details that make Adams your best value for clean, dry, cool compressed air or gas.

R. P. ADAMS CO., INC. • 215 East Park Drive, Buffalo 17, N. Y.

AFTERCOOLERS

For more facts Circle 502 on Reader Service Card

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For more about these items, circle item numbers on Reader Service Card next to back cover.

57—Control Valves. Catalog GV-101 (16 pages) presents engineering, specification, and purchasing data on line of cast, barstock, and special valves. Sizes ¼ to 14 in.; pressures from high vacuum to 50,000 psi. *General Kinetics Corp.*

PIPES AND VALVES

58—Diaphragm Valves. Bulletin No. 1610 (5 pages) discusses impervious graphite valves with a high flow coefficient factor. Valves have standard flanges attached. Come in seven diameter sizes—to 8 in. *Falls Industries, Inc.*

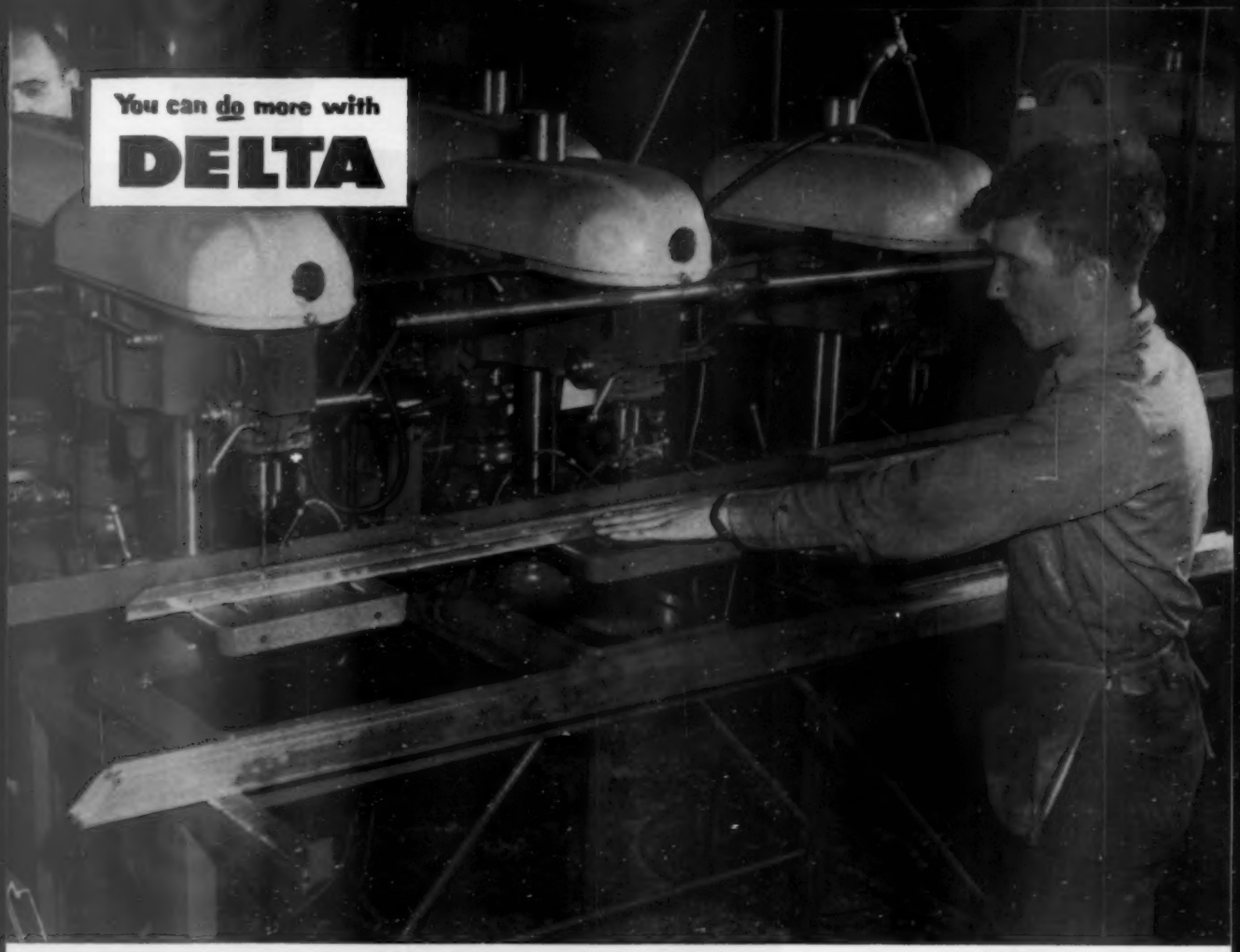
59—Hose. Air, water, polypurpose, spray, welding, and booster hose are described in loose-leaf booklet. Has useful information on applications, cover, reinforcement, lengths, packaging, and recommended couplings. *Swan Rubber Co.*

60—Tubing. This 4-pager contains a quick-reference weight chart for square and rectangular welded steel tubing. Other details include twist, straightness, cutting-length tolerances, diagonal dimensions. *The Standard Tube Co.*

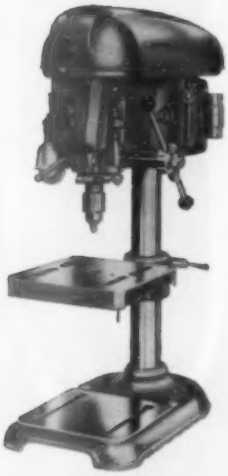
61—Regulators. Catalog J160-1 is an 8-pager on sliding gate pressure regulators for use with steam, water, air, oil, gas, corrosive chemicals. Describes applications of four types of regulators. Photos, diagrams. *OPW-Jordan.*

62—Steam Traps. How installation and material costs can be kept down by the use of these type "T" forged steel traps is explained in Catalog No. 200 (8 pages). Has data on design, sizes, applications. *Velan Steam Specialties Inc.*

63—Gate Valves. Circular No. 610 (4 pages) describes new union bonnet bronze gate valve. Cutaway drawings show features; table lists dimensions in inches and weights. Design and material information. *The Lunkenheimer Co.*



Cuts drilling time by 60%



Delta 15" Drill Press, also 20", 17", 14" and 14" Super-Hi Sensitive. Available in floor, bench, and multiple spindle models.

This substantial reduction in drilling time is the result of ingenuity plus a combination of Delta drill presses in two and three spindle set-ups. Spacing machines at a specified distance between holes and using bar connecting operating levers, Capitol Products Company provides *simultaneous* drilling in production of aluminum storm doors. The Mechanicsburg, Pa. firm has standardized on Delta drill presses because these tools assure the adaptability, ruggedness, and accuracy required. In addition, maintenance and servicing are greatly simplified.

Delta drill presses have set the industry standards for years —they cost less to buy, less to operate and less to maintain. Visit your Delta Industrial Distributor (listed under "TOOLS" or "MACHINERY" in the Yellow Pages)—choose the tool to fit *your* needs from the world's most complete line. For FREE Delta Industrial Catalog showing 61 machines, 302 models, over 1400 accessories, write: Rockwell Manufacturing Company, Delta Power Tool Division, 628H N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Box 420, Guelph, Ontario.

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another fine product by

ROCKWELL

For more facts Circle 504 on Reader Service Card

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. . . he need only be a giant.

he need only do the things
that only a giant can do . . .
and he will be listened to.

we have a giant of our own.
his name is diesel.
he is an engine—
a supplier and creator of power.
his jobs are many and varied,
his demands are infrequent and few.

in an emergency
he can work on almost any fuel.
on assignment
he can work almost anywhere at all.

he makes the boats go . . .
towboats on the Mississippi,
harbor boats in Pakistan,
fishing fleets out of Portugal,
tuna clippers off Peru.
in wartime he drove submarines
and landing craft.
today he helps atomic vessels
do their job.

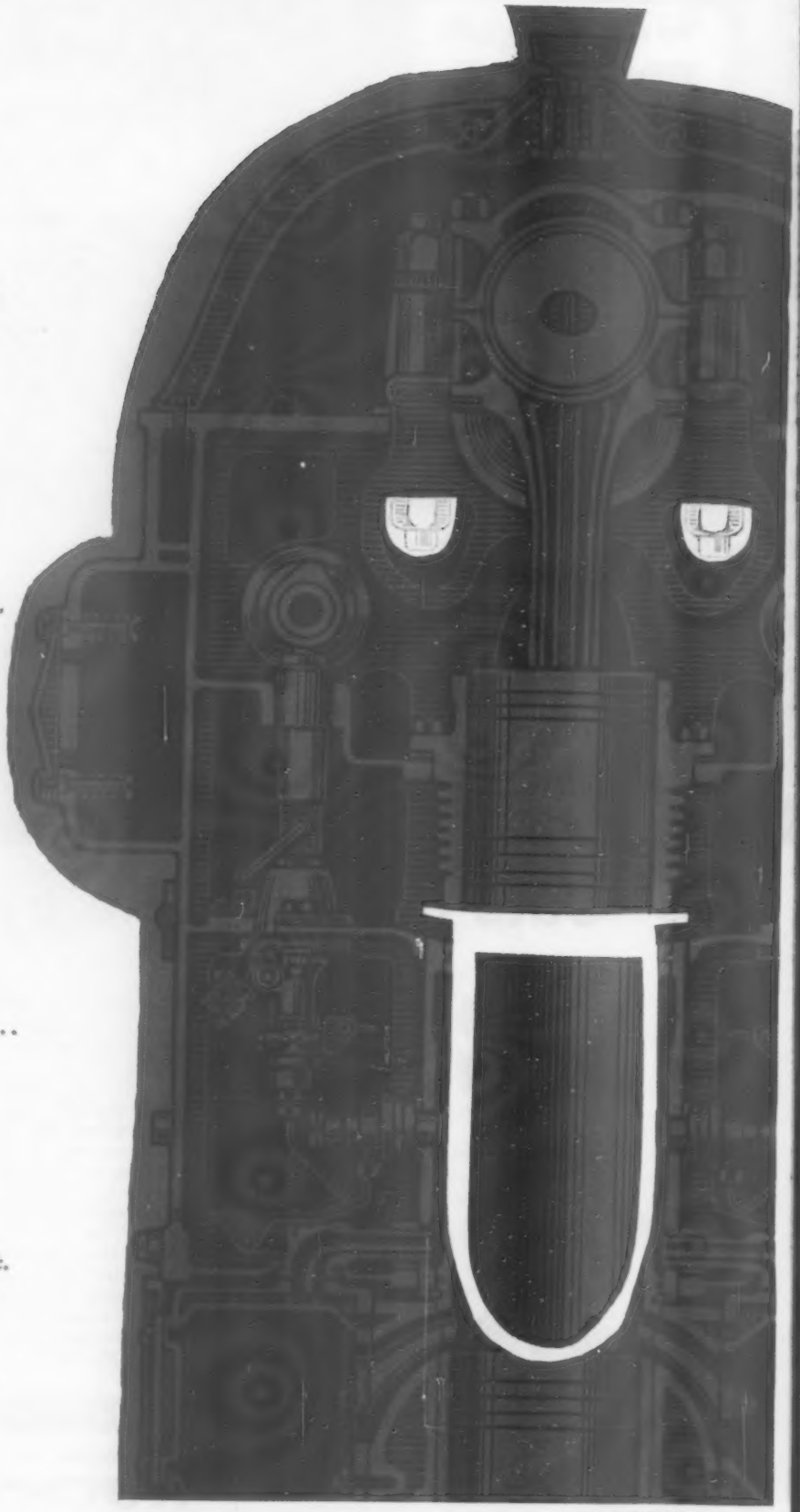
he drives . . .
cement mills in Indonesia,
dredges in Manila Bay,
oil drills in Venezuela,
rigs in the Gulf of Mexico.
he pulls buses, trucks and tractors . . .
locomotives, rock-crushers
and bulldozers.

he generates . . .
light for cities
and power for plants,
electricity for homes
and more for hospitals.
he powers
missile stations in Wyoming,
radio stations in Sudan
and emergency stations in New York.

there is no country in the free world
where he is a stranger.

there is nothing he will not tackle
and little he cannot do.

his voice is in his accomplishments
and you hear it every day.



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If your business demands effective, dependable and economical power—you will be interested in learning more about our complete line of diesel engines.

Write to: Diesel Division, Fairbanks, Morse & Co., Beloit, Wisconsin.

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Fairbanks-Morse Opposed-Piston
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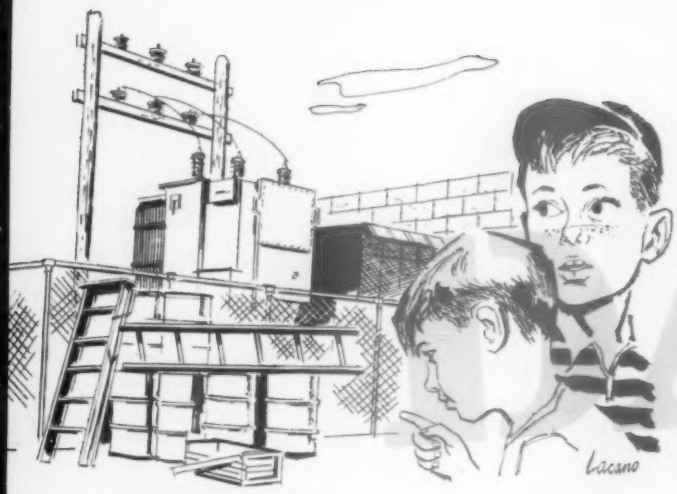

At your substation

at distribution points

THIS simple CHECKLIST puts the STOPS

Whether you make servomotors or sledgehammers, electrical equipment accidents in the plant are usually caused by the same basic list of unsafe practices—practices that will eventually rob *you* of big money.

What are these hazardous electrical practices?

To get the answer, FACTORY turned to Alfred L. Dowden, a pro in the industrial insurance field. In reply he came up with the "do-it-now" electrical hazard checklist you find here.

Make the checks suggested by Mr. Dowden. If you're able to answer "yes" to all the questions (in bold face) chances are your plant is safe from electrical equipment accidents.

High-voltage equipment (substation)

Is area completely enclosed and fence anchored?

Any unprotected or half-protected high-voltage area will eventually be "explored" by some outsider or unauthorized employee.

Seldom does a year go by without tragic injury to children playing in unfenced high-voltage areas. To kids, a cluttered fence area looks more tempting than a "jungle gym."

By ALFRED L. DOWDEN
Electrical Engineer, Loss Prevention Department
Liberty Mutual Insurance Company, Boston

Is the area locked at all times?

An unlocked gate is an invitation to the curious, the idle, and the destructive.

I've seen too many secure-looking substation gates left unlocked, or carelessly locked with a piece of wire. Recently I saw a new gate, complete with heavy chain and two padlocks. But the locks were hung on for effect. To gain entrance you simply unwound the chain.

If the fence enclosure is metal, is it grounded?

If any live conductor coming into the substation falls, it will probably strike the fence. Unless it's grounded, the fence will become one big electrocution device.

I remember a hurricane which did tremendous damage to property. But only one life was lost—a pedestrian struck a match on a metal fence. A still unrepaired primary conductor had fallen across the metal. A similar fatal accident occurred when a worker tried to open the gate of an ungrounded enclosure. Unknown to the hapless fellow, an overhead primary had been blown across the fence several spans away.

Is piled-up junk cleared away from the enclosure?

This practice is like cutting off the top of the fence by an amount equal to the height of the pile.

We frequently find piles of lumber, drums, or construction materials stored smack up against substation fences. What an invitation to kids playing

in portable tools

At your substation *danger lurks if lumber, drums, or construction materials are piled up against protecting fences. More than just an invitation to climb the fence—to a curious youngster this kind of carelessness can also turn into an invitation to death.*

At distribution points, *such as fuse or switch boxes, danger lurks when you fail to keep the door securely locked. Pity the poor fellow who reaches into the box expecting to find a sandwich and receives instead a jaw-shattering jolt of electricity.*

In portable tools *danger lurks when you fail to provide each unit with three-pronged grounded cable. If he's lucky, the worker using an electrically defective tool will just be "shocked" at your carelessness. If he's not so lucky, he'll be dead.*

on ELECTRICAL equipment DANGERS

"follow-the-leader." It's easier for the curious to get in than out. Too often they climb over the fence and go out the gate—on a stretcher.

Is area clearly posted with warning signs?

Large, easy-to-read, weatherproof signs are absolutely essential to put employees and others working nearby on their guard. We continually find high-voltage signs that are bent, faded, or completely obliterated. They get the same respect as an illegible "No Trespassing" sign during hunting season.

If building adjoins, are windows screened or barred?

Pity the poor fellow who thoughtlessly reaches out the window with a metal object and accidentally makes contact with a charged conductor.

A window facing a substation is the wrong way to ventilate a plant. If it's an accessible window, someone will eventually be placed in a hazardous situation. Even if it's inaccessible, it can become a vehicle for spreading a substation fire into the plant.

Are you sure no one uses the area for storage?

Electrical maintenance personnel should be the only persons expected to understand the potential hazards around high-voltage equipment. If you need more storage space, put up another fence.

Now and then we find a high-voltage area that looks like a contractor's warehouse—scaffolds, drop-cloths, pipe, cable, I-beams, old machine tools. A locked gate is to protect the unauthorized. Recently, a carpenter was electrocuted when he reached into his tool box, which he had stored in a substation cubicle. The supervisor had given him access to the area, but didn't realize he was opening the cubicle.

Are all safety interlocks in sound working order?

The advantage of an interlock system is that it reduces the amount of thinking and checking an electrician must do to work safely. When the system is tampered with, even slightly, it becomes more dangerous than unguarded equipment.

It seems that every time we investigate an accident that happened because an interlock was jumpered or jimmied, we find the victim could have done the job without short cutting or with the equipment de-energized. With sensible safety procedures and equipment, there are no valid reasons to cheat interlocks.

Distribution voltage equipment

Is all fixed wiring in rigid conduit?

Nothing is as dependable or safe as properly installed rigid conduit. It gives the ultimate in mechanical protection to the conductors. And enclosing the conductors within a strong, rigid pipe provides maximum safety to those working on or near plant wiring.

Protective grounding is the key to preventing electrical shock accidents. Rigid conduit will take far more abuse and still maintain the 100% safety impossible in a flexible or thinner-walled enclosure.

Turn the page

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Only T-J's complete line can assure you a cylinder of either air or hydraulic application – with practically limitless design specifications for bore, stroke, pressure range and even delivery requirement. From the time-tested, standard tie-rod air and hydraulic, to the exclusive T-J Spacemaker, and including the recently introduced Squair Head, T-J cylinders give you more features for efficient, long-lasting operation. Write today!

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ELECTRICAL SAFETY

Begins on page 216

Are there conduit breaks anywhere in the plant?

Any break in a conduit destroys its protective ground. Conduit continuity must be checked periodically. Many workers have been burned or killed by conduit that had been broken or disconnected.

Do all sheathed cables incorporate a grounding conductor?

The sheath of a flexible cable is not a dependable grounding conductor. Accident reports show many cases where the fittings connecting flexible cable sheath to the switch and fuse boxes, etc., looked like good connections—but weren't. The only safe practice is to use separate conductors for grounding.

Are all motor and equipment frames grounded?

Every part of any machine that might become charged (from a fault to frame) must be carefully grounded. The sheath of flexible armored cable is not a dependable grounding method.

After the accident it's too late to put on grounding straps or to make sure the ones that were there are bonded properly.

Are switch and fuse boxes locked?

Open boxes are bad for two reasons: (1) They make inviting places for employees to stash away personal items, thus placing them in danger of contact with live parts; (2) If there is a serious fault within the box, the products of the arc may burn anyone nearby. Once you've seen some of the junk that turns up during switch-box inspections (steel wool, cups, tools, sandwiches), you'll know why locked boxes are the only completely safe ones. And when you buy new or replacement switch boxes be sure you get the type that cannot be opened unless the power is off.

Are open-type switchboards protected against accidental contact?

No employee should be subjected to a hazardous situation when he must walk or carry objects in front of or behind electrical equipment. It's such a simple job to put a railing or screen around a switchboard. I wonder why so many plant managers

Rahr Malting Co. plant, Manitowoc, Wisconsin

Protecting a multi-million dollar investment

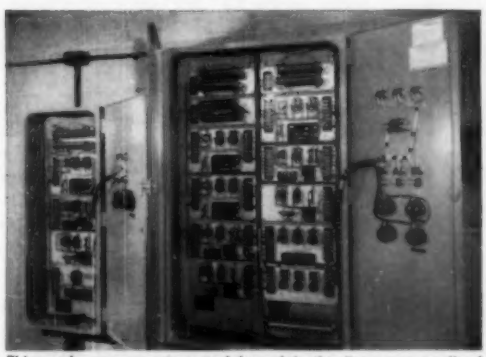
Gamewell Flexalarm System protects one of the world's largest malting plants.

This huge Rahr Malting Co. plant, pictured above, with its sister plant at Shakopee, Minnesota, supplies approximately 12 percent of the nation's malt. Its widespread facilities *demand modern, maximum* fire protection. Acutely aware of this need, company officials recently installed a Gamewell Flexalarm System.

All critical areas are protected by either manual coded pull boxes or a sprinkler system. In a matter of seconds, when an alarm is "pulled" or a sprinkler head goes off, the system *automatically identifies* the *fire zone, sounds* a *general evacuation alarm* and *alerts* the *city fire department* — all at the same time!

Is your plant this well protected?

Let a Gamewell Survey answer this vital question without obligation. We'll be happy to assist with fire detection engineering of new construction, expansion or modernization, if desired. Write The GAMEWELL COMPANY, 1607 Chestnut Street, Newton Upper Falls 64, Massachusetts. A Subsidiary of E. W. Bliss Company.



This modern, compact control board is the "nerve center" of Gamewell's Flexalarm System, performing a constant automatic fire watch 24-hours a day.

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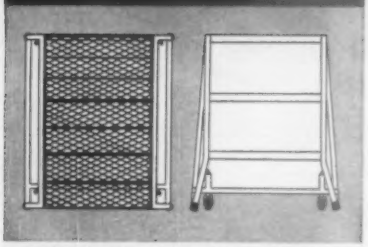
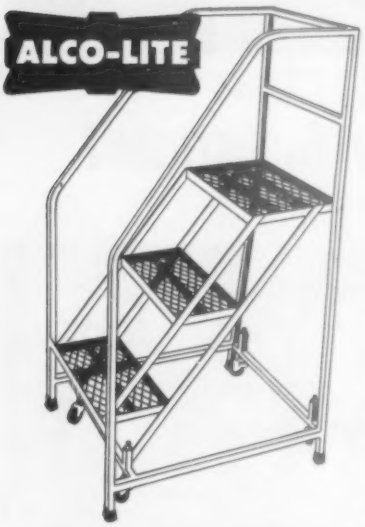
FIRST...WHEN SECONDS COUNT

NEW Alco-Lite Spread-base Ladder Stands available at the same ECONOMICAL PRICES as standard models!



Drawings show the base dimensions in relation to step and platform dimensions on the NEW Spread-base models.



Specify *NEW* Alco-Lite Spread-base Ladder-Stands if a wide base ladder is desired. Like competing ladders, however, step and platform dimensions are the same as found on standard models. If aisle space is narrow, specify standard Alco-Lite models, which provide the same amount of work surface but require less aisle width.

Aluminum Ladder Co.
West Darlington Street Ext.
FLORENCE 7 S. CAROLINA

ELECTRICAL SAFETY

Begins on page 216

leave it undone? Our records show that the people who make the accidental contacts are usually not switchboard operators.

Are insulated fuse pullers readily available?

Replacing cartridge fuses by hand exposes employees to contact with adjacent live parts in the fuse-box. Fuse pullers are not expensive. Yet we continually get reports on employees hurt when replacing fuses without first disconnecting the load. Best bet is to limit the employees authorized to change fuses—and teach them proper procedures.

Are metal shell sockets kept out of reach?

There isn't enough wiring space in a metal shell socket to permanently prevent conductor strands from touching the metal shell. And at one time or another, at almost any location, an employee may be in contact with a grounded conductor. Such contact with a live shell at 110 or 220 volts is always serious.

One of the worst offenses is the use of pull-chain sockets in washrooms or basements. Many plants don't believe they exist until a safety search is made. A shock is just as dangerous in a warehouse restroom as on the assembly floor.

Are safe wiring and equipment used in hazardous areas?

Conventional wiring and fixtures have no place in dusty, explosive, or corrosive atmospheres. Be wary of building usage changes. A warehouse built for empty drums may become a paint storage area. Fuels and solvents are sometimes brought into formerly non-critical areas. New manufacturing processes introduce hazards like plastic ducts where previously only metal chips collected. When usage changes, wiring has to be changed. Otherwise, you may have to rebuild—after the explosion.

Are outdoor plugs and fittings the weatherproof type?

Outdoor outlets should be tightly constructed, well-grounded, and covered when not in use. You don't need hurricanes or salt water spray

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WHO G.E. WARNER MANAGER

WHICH OPEN ⟷ SHUT

WHAT

WHERE ELEVATOR

HOW

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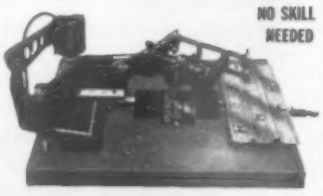

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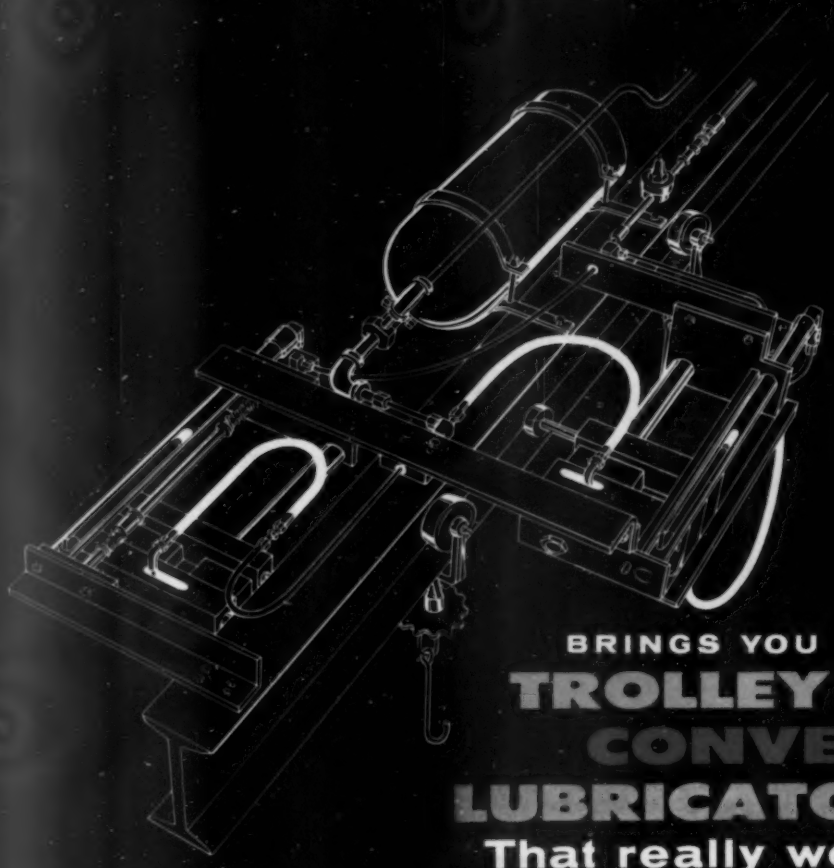

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★ **AUTOMATIC**—lubricates while conveyor is in operation.

★ **DEPENDABLE**—it never misses a fitting.

★ **COST-SAVING** — self-amortizing.

Another major triumph for ARO engineering! This new ARO-developed trolley lubricator automatically lubricates all grease fittings on a conveyor—it never misses—it is air-powered, has floor-level control. The ARO lubricator is self-adjusting, completely self-contained, designed for fast, easy installation in existing trolley conveyors. Will handle standard conveyor wheels intermixed. No dripping. This unit cannot discharge lubricant unless coupler is properly connected to fitting. Avoids costly conveyor downtime, saves labor, money and time for you. Ask your ARO Distributor for full details, or write today for brochure.

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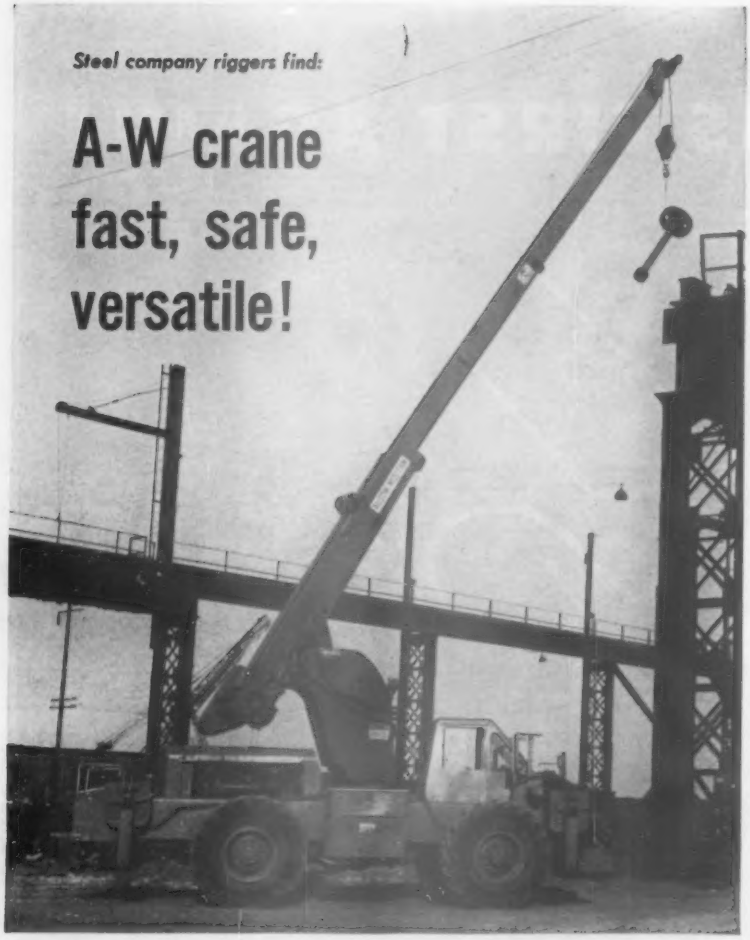


Telescoping boom of A-W crane removes damaged gear from overhead crane.

Riggers at Columbia-Geneva Steel Division of United States Steel Corporation, have an Austin-Western Model 210 hydraulic crane to work for them.

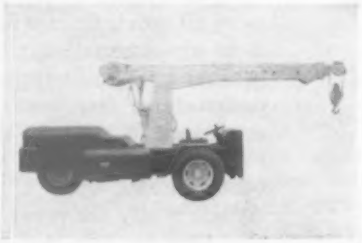
A precision unit

They have found it a good, fast, safe piece of equipment. It is used primarily for such maintenance work as repairing overhead cranes, installing water pumps, and erecting steel. More and more uses are found for it daily, often for materials handling. It is particularly useful for any work that requires precision lifting, carrying or placement. U.S. Steel also has an A-W at its Fairless Works, in eastern Pennsylvania.

Available in five models; capacities range from 5 to 11 tons. Most feature all-wheel drive, all-wheel steering, continuous full circle boom rotation, telescoping boom, and hydraulic controls. Optional features available.

Complete line

Why not investigate this complete line of lift, carry and place equipment. For facts and figures, or a demonstration, contact your nearby Austin-Western distributor or write us.



New Model 110—5-ton capacity range. 220° boom swing without cab. Dual front driving wheels; dual rear trunnion steering.

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to start deterioration. Any moisture on a dusty surface will become a conductor. You may be lucky and just end up with a short circuit.

Portable tools

Is protective grounding a part of every portable tool?

All tools need a third wire for positive ground (four wires for 3-phase equipment) with appropriate plugs and outlets so the ground connection is made as the plug is inserted in the outlet.

Probably the worst single cause of serious accidents is the grounded portable tool. Accidents like this don't have to happen. Once an employee gets "buzzed" with leakage current from the tool frame, through his body to ground, he'll never again work at ease with portable equipment. That is, unless he has the assurance of safety grounding.

Do all portable lights have safe handles and guards?

To be safe, a "trouble" lamp must have either a completely insulated handle or a connection to the ground conductor in the 3-wire extension cord. And a guard must effectively protect the bulb.

Worst offenders are extension lights made from brass shell sockets. They make it easy to break lamps. Many fatal accidents have resulted from a combination of a grounded surface, a perspiring worker, and a charged brass shell socket.

Are your workers using low-voltage (under 50 volts) extension lights when working inside tanks, ducts, furnaces, or in normally wet areas?

For a modest investment you can put an end to all trouble-lamp hazards. New equipment can furnish the same light at a voltage stepped down to a safe value.

Even with the best 110-volt trouble lamps, electrical accidents still occur when an employee must work in continual contact with a grounded surface. For example, he may touch live parts if the lamp is broken. With low-voltage lighting equipment widely available now, there is no longer any excuse for high-voltage accidents. **END**

New Concept in Motor Protection!

Tri-Clad '55' Thermo-Tector SYSTEM ENDS OVERLOAD BURNOUT!

General Electric offers a *totally new* type of protection on *all* Tri-Clad '55' motors 7½-125 hp!

Exclusive THERMO-TECTOR system has heat-sensing switches buried in stator windings. Switches shut off motor *only* when stalls, overloads or other conditions threaten heat damage to motor windings.

Unique THERMO-TECTOR system "anticipation" feature varies motor shut-off point according to rate of winding heat rise. This flexibility allows *maximum motor output* under all conditions.

TURN PAGE FOR FURTHER INFORMATION

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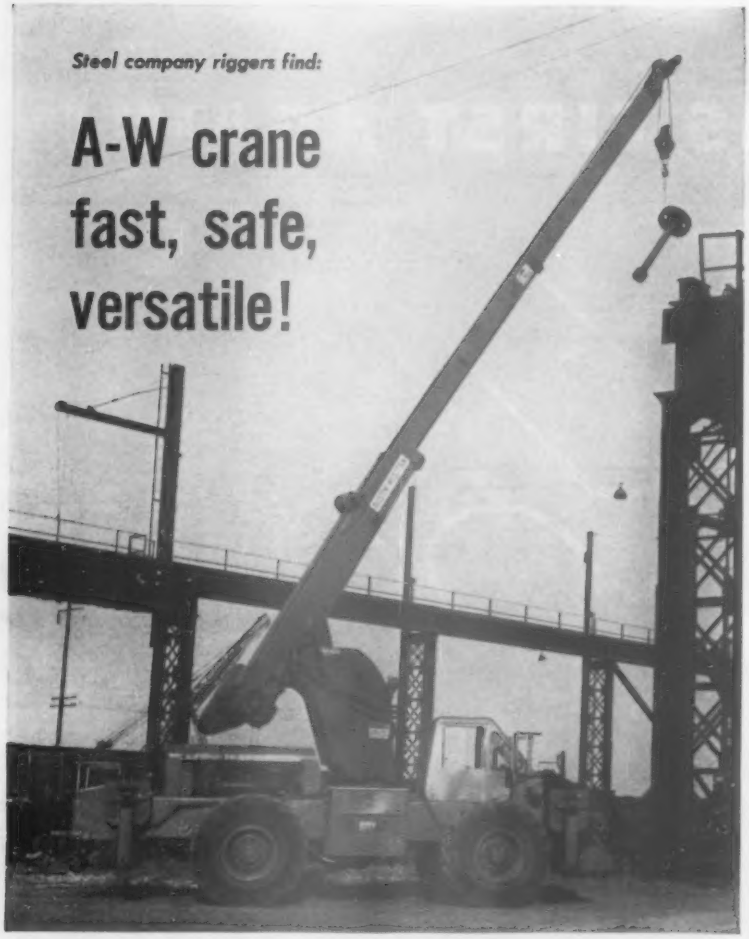
A-W crane fast, safe, versatile!



Telescoping boom of A-W crane removes damaged gear from overhead crane.

Riggers at Columbia-Geneva Steel Division of United States Steel Corporation, have an Austin-Western Model 210 hydraulic crane to work for them.

A precision unit

They have found it a good, fast, safe piece of equipment. It is used primarily for such maintenance work as repairing overhead cranes, installing water pumps, and erecting steel. More and more uses are found for it daily, often for materials handling. It is particularly useful for any work that requires precision lifting, carrying or placement. U.S. Steel also has an A-W at its Fairless Works, in eastern Pennsylvania.

Available in five models; capacities range from 5 to 11 tons. Most feature all-wheel drive, all-wheel steering, continuous full circle boom rotation, telescoping boom, and hydraulic controls. Optional features available.

Complete line

Why not investigate this complete line of lift, carry and place equipment. For facts and figures, or a demonstration, contact your nearby Austin-Western distributor or write us.

New Model 110—5-ton capacity range. 220° boom swing without cab. Dual front driving wheels; dual rear trunnion steering.

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Power graders • Motor sweepers • Road rollers • Hydraulic cranes

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222 For more facts Circle 511 on Reader Service Card

to start deterioration. Any moisture on a dusty surface will become a conductor. You may be lucky and just end up with a short circuit.

Portable tools

Is protective grounding a part of every portable tool?

All tools need a third wire for positive ground (four wires for 3-phase equipment) with appropriate plugs and outlets so the ground connection is made as the plug is inserted in the outlet.

Probably the worst single cause of serious accidents is the grounded portable tool. Accidents like this don't have to happen. Once an employee gets "buzzed" with leakage current from the tool frame, through his body to ground, he'll never again work at ease with portable equipment. That is, unless he has the assurance of safety grounding.

Do all portable lights have safe handles and guards?

To be safe, a "trouble" lamp must have either a completely insulated handle or a connection to the ground conductor in the 3-wire extension cord. And a guard must effectively protect the bulb.

Worst offenders are extension lights made from brass shell sockets. They make it easy to break lamps. Many fatal accidents have resulted from a combination of a grounded surface, a perspiring worker, and a charged brass shell socket.

Are your workers using low-voltage (under 50 volts) extension lights when working inside tanks, ducts, furnaces, or in normally wet areas?

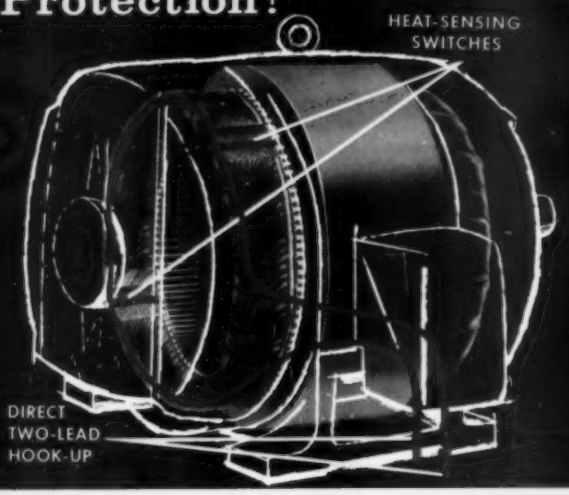
For a modest investment you can put an end to all trouble-lamp hazards. New equipment can furnish the same light at a voltage stepped down to a safe value.

Even with the best 110-volt trouble lamps, electrical accidents still occur when an employee must work in continual contact with a grounded surface. For example, he may touch live parts if the lamp is broken. With low-voltage lighting equipment widely available now, there is no longer any excuse for high-voltage accidents. **END**

For more facts Circle 512 on Reader Service Card ➤

New Concept in Motor Protection!

Tri-Clad '55' Thermo-Tector SYSTEM ENDS OVERLOAD BURNOUT!



General Electric offers a *totally new* type of protection on *all* Tri-Clad '55' motors 7½-125 hp!

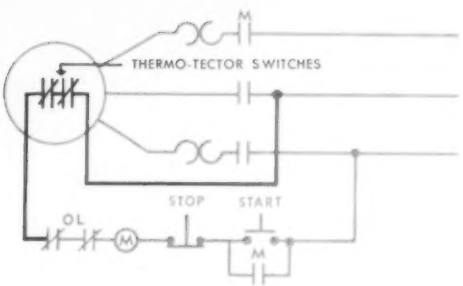
Exclusive THERMO-TECTOR system has heat-sensing switches buried in stator windings. Switches shut off motor *only* when stalls, overloads or other conditions threaten heat damage to motor windings.

Unique THERMO-TECTOR system "anticipation" feature varies motor shut-off point according to rate of winding heat rise. This flexibility allows *maximum motor output* under all conditions.

TURN PAGE FOR FURTHER INFORMATION

NEW Tri-Clad® '55' THERMO-TECTOR SYSTEM

Allows Full Motor Output— No Wasteful "Safety Margin" Needed



Thermo-Tector system needs *no costly amplifying relays*, connects directly to any G-E motor controller.

You get full output from Tri-Clad '55' motors with Thermo-Tector system. Variable response feature of heat-sensing switches allows motor to operate right up to safe limits under any operating condition.

Thermo-Tector switches are offered on *all* Tri-Clad '55' motors in frames 254U-445U. For more information, contact your G-E Apparatus Sales Office or write for Bulletin GEA-7092, Section 866-03, Schenectady 5, N. Y.

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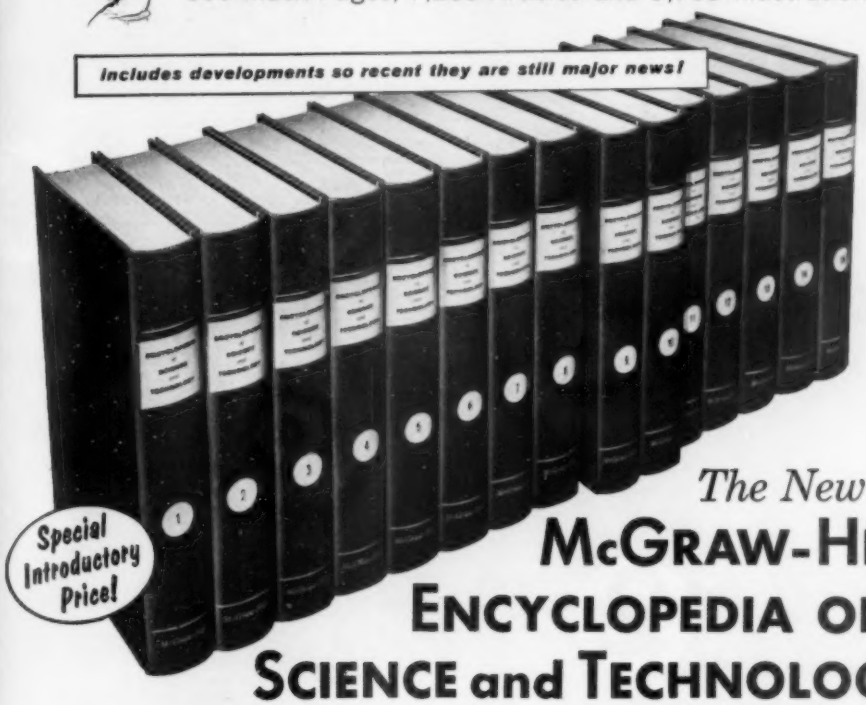

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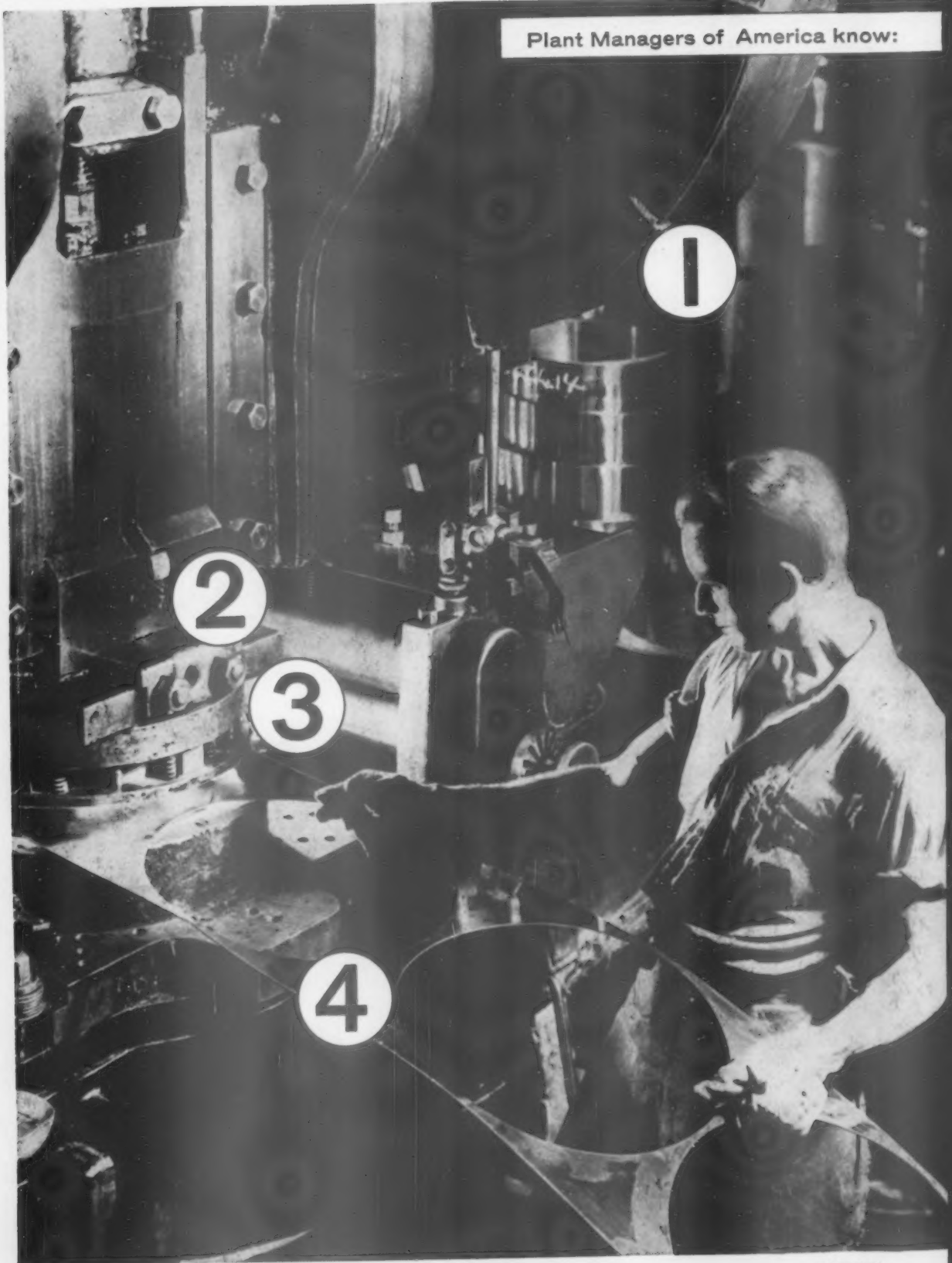
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Routine can be the enemy of safety. That's when hidden hazards enter the picture . . . possibly lead to an accident that cuts production!

To get sound advice on improving protection for their production, men, materials and equipment, many of today's leading companies are turning to American Mutual. AM Safety Engineers offer advice and counseling that can help you not only prevent accidents, but may improve productivity. Their wide experience and special knowledge of industry problems can make them very valuable men for you to consult on your safety problems.

Many AM policyholders who have put the AM man's suggestions into operation have benefited from improved production and lower insurance costs. This could favorably affect your profits.

Take the case of Sprague Electric Company, North Adams, Mass. They saved $546,163 in 12 years. (The difference between manual rates for the industry and rates actually paid.) Add to that a dividend saving of $90,173 and you begin to see what American Mutual can do. Why not see what we can do for your company? American Mutual Liability Company, Dept. F-4, Wakefield, Mass.

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FACTORY

MATERIALS NEWS

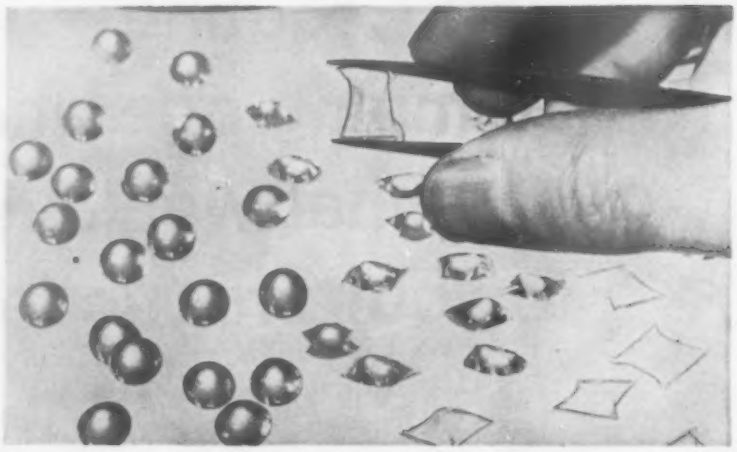
For more about these items, circle numbers on Reader Service Card next to back cover.

Hollow glass pillows provide low-density filler

Tiny pillows and balls of glass are now being produced at low cost for filler, packing, filtering, and tumbling applications. Pillows come as both solid and hollow pieces in lengths to ½ in. Balls come in diameters up to ½ in.

The hollow pillows provide a low-density filler material for such applications as packing in aircraft wings where the glass gives both structural support and buoyancy. They can also be used as filler in the casting of larger plastic pieces.

The solid pillows are for use in chemical processing and electroplating operations. *Corning Glass Works* (Circle 195).



196—Aluminum Impregnated Fabrics resist temperatures up to 2500 F. The process permits the fabric to retain its original texture, design, and flexibility. Company will treat one yard of your fabric in any color, without cost, to demonstrate. *Baxter, Kelly & Faust, Inc.*

197—Rinse Water Additive inhibits corrosion of copper and brass, produces an invisible film that prevents tarnishing, staining, spotting-out, and finger-marking of copper and its alloys. Entek CU-56 is diluted 99 to 1, does not contain chromates. *Enthone, Inc.*

198—Fire-Resistant Tile is suitable where a single-unit nominal 6-in. wall with two-hour fire-resistance rating (unplastered) is required. A variety of ceramic glaze finishes are available on the select surface only, with smooth unselected, unglazed back. *Natco Corp.*

Porous filter can be washed, wrung, re-used

Urethane foam with a porous, skeletal structure is now available as a filtration material for consumer products. Here are some of the advantages of this permanent-type filter: Home-owners can wash it repeatedly, even in automatic washers; it can be wrung out like a sponge and reinstalled; it need not be sprayed with oil or other fluids to trap airborne particles.

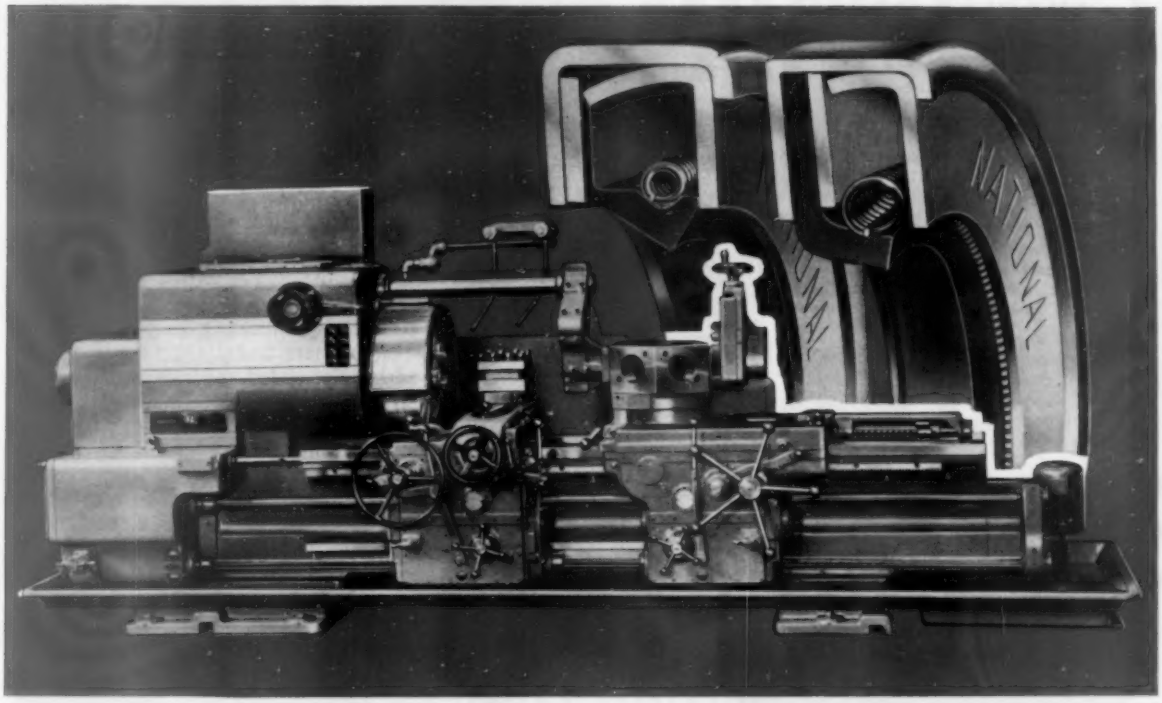
The geometry of the material, called ScottFoam, minimizes the possibility of open channels forming in the filter. Its resilience and strength prevent displacement of skeletal strands in normal use. The foam is produced in six standard porosity grades and is available in thicknesses up to 6 inches. *Scott Paper Co.* (Circle 199).

Vinyl hot-water pipe

Vinyl plastic that withstands temperatures 60 degrees higher than conventional vinyls (up to 200 F.) can be used in hot-water plumbing and hot-acid piping. Hi-temp Geon pipe handles pressures as high as 160 lb. psi. at 180 F. It passed tests of contact with 98% sulfuric acid at 185 F. for 30 days. Easily cemented, threaded, formed. *B. F. Goodrich Chemical Co.* (Circle 200)

Turn the page

Better products, *faster*, from your Bearing Specialist:



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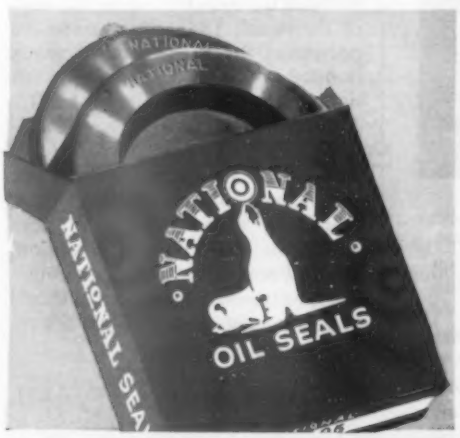

Your Bearing Specialist will help you set up a working stock to handle repair jobs in a hurry

You can depend on National Oil Seals to lengthen vital bearing life, cut downtime losses, and help hold production schedules. They're made to seal *in* lubricant, and seal *out* abrasive dirt. The key to this protection guarantee is the quality construction of every National Oil Seal.

National *Micro-Torc* Seals feature specially processed leather that stays flexible, lasts longer, and runs cooler. *Syntech* rubber seals are specially blended to meet exacting conditions of temperature, shaft speed, and other critical factors. Both types come in all sizes and are always available for fast delivery whenever you need them. Call your Bearing Specialist. He's nearby for ready help.

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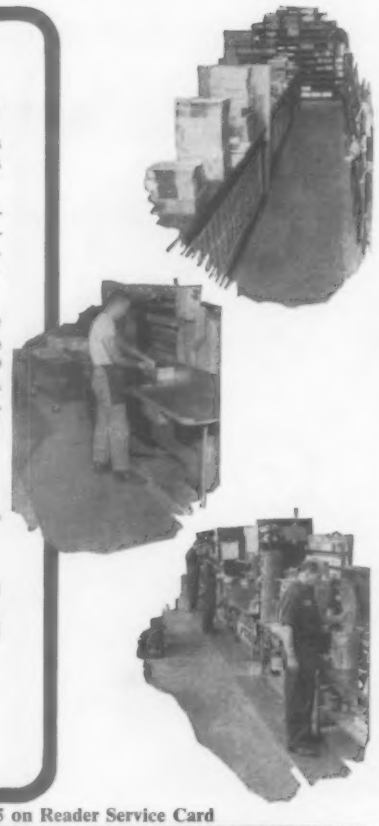

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FACTORY / MATERIALS NEWS

Begins on page 228

For more about these items, circle item numbers on Reader Service Card next to back cover.

201—Electrical Insulator, called Anilite, combines the good electrical properties and mechanical strength of vulcanized fibre with the low-moisture absorption of phenolic laminates. Can be drawn or formed into permanent shapes. Low cost. *National Vulcanized Fibre Co.*

202—Indicating Liquids for manometers and hydrostatic gages are color-coded, range in specific gravity from 0.824 to 13.546 at 68 F., giving a wide choice of instrument sensitivity and range. Each of seven liquids has its own distinctive color. *King Engineering Corp.*

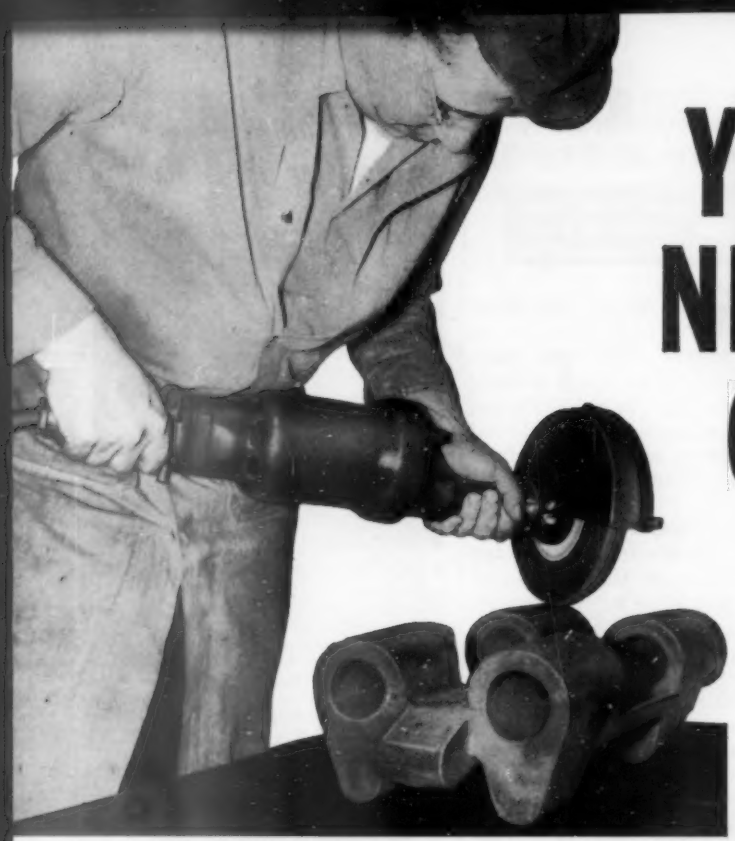
203—Translucent Building Panels have mechanically interlocked I-beam extrusions that form the core of the panel. Glass fiber reinforced polyester sheets are permanently bonded to this core to give a strong, lightweight panel (1½ lb. per sq. ft.). *Kalwall Corp.*

204—Rust Penetrant has a water soluble, non-oil base, and is odorless, non-toxic, non-staining, and non-flammable. Said to have exceptionally fast action, the penetrant comes in 12-oz. aerosol dispensers, pint and half-pint cans, 5- and 55-gal drums. *Supersite Corp.*

205—Metal Primer, Clo-Flex 621, is said to have excellent adhesion to iron and steel, possess extreme flexibility, and sets to touch in 15 min. Sprayable and non-flammable, the primer gives a coverage of 390 sq. ft. per gal. per mil. *The Harrington Paint Co., Inc.*

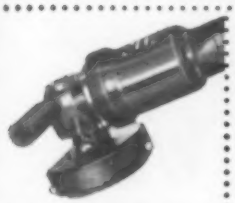
Turn the page

For more facts Circle 516 on Reader Service Card
For more facts Circle 517 on Reader Service Card ➤



YOU NEED CP HICYCLE GRINDERS

If you do "heavy duty" production grinding



CP-550-SAG with stationary guard for rotary cup.

CP-550-SAG with revolving cup guard.

CP-550-SAS with angle sander.

CP-SAG with guard for 9" cut-off wheel or depressed center disc wheel.

CP-550-SAP with polisher.

And here are 8 reasons why...

1. **Hicycle motor** of advanced squirrel-cage design runs on 180 cycles, 220 volts, 3-phase current. No brushes to replace . . . No armature to burn out. 2. **Speed sag** is less than 15% under load, for maximum output. 3. **"Tri-Flo" cooling system** minimizes "hot spots". Keeps temperature rise at key points as much as 28° lower than with conventional type cooling. Prevents burnouts. 4. **Built-in overspeed protection.** 5. **Power/Weight Ratio** is outstanding because high strength magnesium castings are used for motor, gear case, and switch handle. 6. **Extra heavy micro-mesh gearing** heat-treated for long service. Oil-sealed ball bearings lubricated for life. 7. **Interchangeable motors,** motor housings, switch handles, and switches between all straight and angle models. 8. **Heavy duty switches** have dust-tight seals and phenolic spacers for insulation and to minimize vibration.

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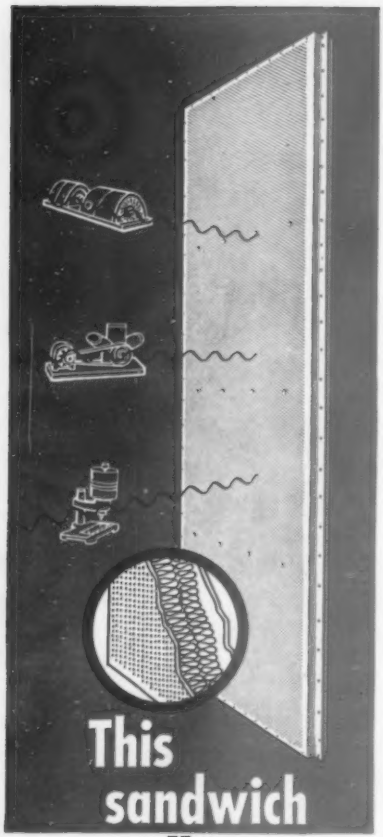

swallows noise

This is an Eckoustic Panel — a very special sandwich, made of two layers of steel wrapped around a blanket of Fiberglas.

You can use it as a modular building block to build a soundproof room or plant office — a machinery enclosure — a production test facility — or, for that matter, practically anything where you must shut noise out, or seal it in.

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Circle 518 on Reader Service Card

FACTORY / MATERIALS NEWS

Begins on page 228

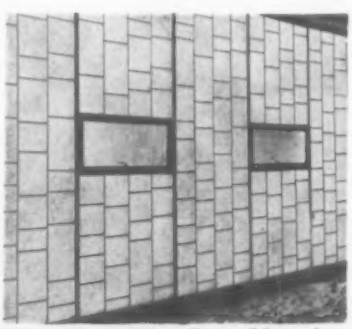
For more about these items, circle item numbers on Reader Service Card next to back cover.

206—Extended Surface Air Filter consists of 2-in.-high pleats set on 1¼-in. centers with each pleat rigidly supported by a strip of cardboard set on edge. In the air stream, pleats become parabolic-shaped pockets, giving extra filter surface. *Arco Mfg. Corp.*

207—High-Temperature Refractory Cements, Astroceram Types A and B, can withstand temperatures of 4300 F. and 5000 F., respectively. Type A can be air-dried, will join ceramics, glass, and metals. Type B, for refractories, must be fired. *Instrumentation Associates.*

208—Synthetic Instrument Grease is stable, non-gumming, won't leave harmful deposits. A lithium soap grease, Anderol-L-793 has built-in rust protection that makes it suitable for clocks, precision bearings, pneumatic and hydraulic systems. *Lehigh Chemical Co.*

209—Cu-Ni-Si Alloy is composed of 1.9% nickel and 0.6% silicon, with the remainder copper. Cunisil-837 has high tensile and yield strengths, high electrical conductivity (30-42% IACS as heat treated), is easily cold-formed before heat treatment. *The Anaconda Co.*



210—Glass Fiber Duct Liner is a resilient, semi-rigid insulation blanket of fine glass fibers bonded by a thermosetting resin. In the ½-in. thickness, material has a noise reduction coefficient of .60. Comes in thicknesses to 2 in.; widths to 4 ft. *Johns-Manville.*

Turn the page

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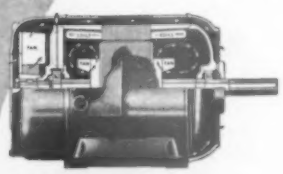

VALLEY

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FOR CONTROL OF AIR, STEAM, AND LIQUIDS

T-800 Remote Bulb Capillary Thermostat for Air, Steam, and Liquids.

- Series T-800 thermostats are designed for air conditioning, heating, ventilating, and industrial applications requiring accurate control at low sensitivities. They are widely used for the control of temperatures in air ducts or chambers, in tanks, and in pipes.
- Choice of elements:
  1. Liquid filled capillary with remote bulb. Standard temperature range from –30F to 300F. Fully compensated stainless steel capillaries available from 8 to 85 feet. Non-compensated copper capillaries furnished in 4 and 6 ft. lengths. Also available with 8-ft. averaging bulb.
  2. Rigid stem liquid filled immersion element. Temperature range from –30F to 300F.
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- All elements are fully interchangeable.
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- Direct or reverse acting. Simple change of pivots converts from direct to reverse acting.
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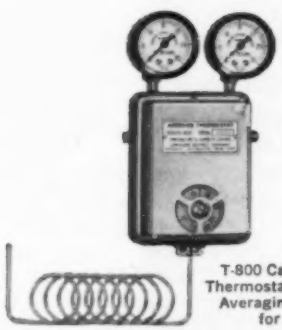
- Used as standard thermostat and as a master controller for readjusting the control setting of a submaster thermostat.

For more information write for bulletin T-800. Johnson Service Company, Milwaukee 1, Wisconsin.



T-800 Capillary Thermostat with 8' Averaging Bulb for Air.

T-802 Rigid Stem Insertion Thermostat for Air.

T-804 Rigid Stem Immersion Thermostat for Liquids.

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FACTORY / MATERIALS NEWS

Begins on page 228

For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS

LITERATURE

211—Molybdenum Metal, its application, properties, and fabrication get detailed coverage in this complete 110-page book that might well serve as a basic text on the element. Charts, tables, engineering data. *Climax Molybdenum Co.*

212—Plastic Lighting catalog for engineers and lighting specialists comes in a handy, durable binder for easy filing and reference. Contains photometric data on company's complete line of prismatic lens panels. *K-S-H Plastics, Inc.*

213—Aluminum Products are detailed in this illustrated 20-pager that gives federal specifications, analyses, mechanical properties, machinability ratings, finishes, and relative costs of aluminum alloys. *Joseph T. Ryerson & Son, Inc.*

214—Thermal Insulation booklet (16 pages) is a guide to the best use of these materials under changing industrial conditions. Insulating theory, charts, and an estimate sheet for figuring your costs. *National Insulation Mfrs. Assn.*

215—Fiberglas Textile fiber materials for industry are described in this 52-page booklet that lists applications, gives extensive technical data. Also tells how Fiberglas is made and fabricated. *Owens-Corning Fiberglas Corp.*

216—Titanium Alloys bulletin lists metallurgical properties, military code designations. Shielded arc, spot, seam and flash welding methods are all described in this 4-pager. *Nooter Corp.*

217—Foundry Refractories are surveyed in this 8-page brochure that has sections on the specific types of materials for cupolas; electric, malleable, and non-ferrous furnaces; and pouring equipment. *Harbison-Walker Refractories Co.*

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designed to collect dust from single machines

portable—easily installed

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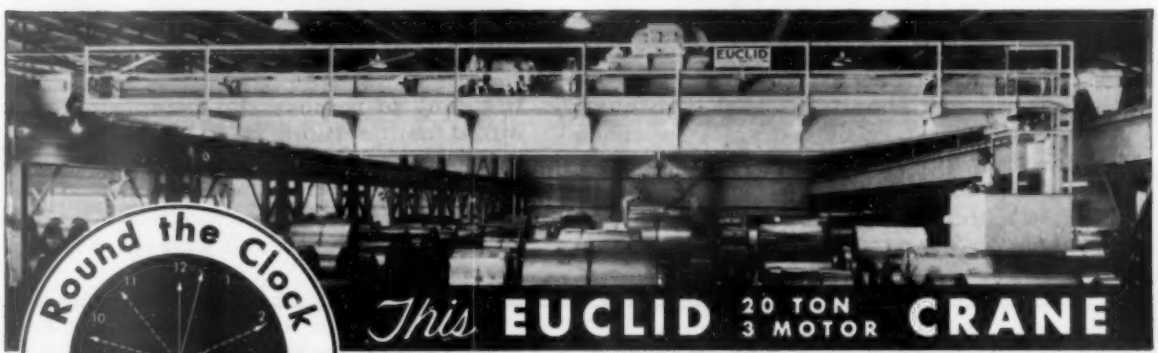

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Expedites Steel Coil Handling IN and OUT of this STEEL WAREHOUSE and PROCESSING PLANT

Yes, practically anytime of the day or night you'll find a man at the controls of this double girder, cab-operated, overhead traveling crane. With an impressive span of 60′ it covers every square foot of one of the large storage bays at the Euclid, Ohio, plant of Chesterfield Steel Service Company. Ease of precision control and rapid acceleration and braking of all travel movements assure an unprecedented coil handling volume.

Built for Class 4 service, this crane is one of seven Euclid cranes in operation in this warehouse.

Euclid builds cranes in a wide range of spans and capacities for all purposes.

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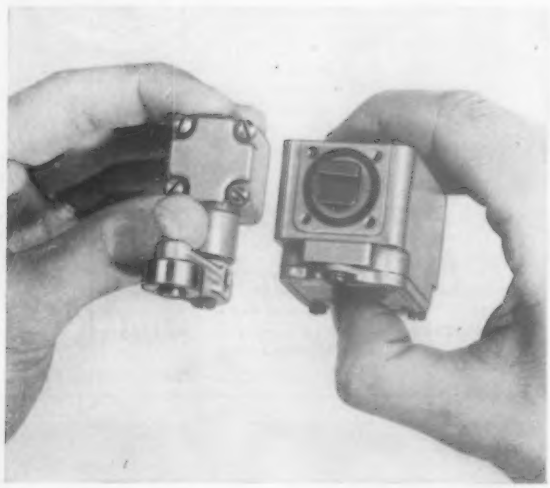
See just how readily adjustable–and durable by making MICRO SWITCH's convincing



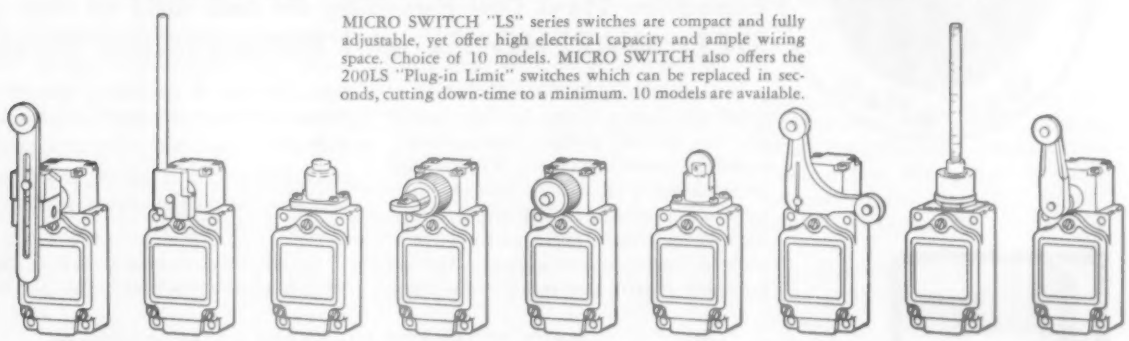
In just twenty seconds check the easy adjustability. Remove just four screws, lift actuator head, turn the plunger shown inside the embedded "O" ring seal. Replace actuator head facing in direction desired —front, back, left or right. Roller arm also has 360-degree adjustability.

It's easy to remove the faceplate for terminal connections in 20 seconds! Captive screws make it quick and easy to remove and replace the faceplate whenever wiring changes are necessary. Oiltight and dust-proof seals on the faceplate, beneath the actuator head and on the roller arm shaft, guard against fouling.

---

9 Different Actuators for Cost-Cutting Versatility

MICRO SWITCH "LS" series switches are compact and fully adjustable, yet offer high electrical capacity and ample wiring space. Choice of 10 models. MICRO SWITCH also offers the 200LS "Plug-in Limit" switches which can be replaced in seconds, cutting down-time to a minimum. 10 models are available.



ADJUSTABLE ROLLER ARM | ROD ACTUATOR | IN-LINE PLUNGER | SIDE ROLLER PLUNGER | SIDE PUSH PLUNGER | ROLLER PLUNGER | YOKE ACTUATOR | COIL SPRING | ROLLER ARM ACTUATOR

–rugged simplicity!

a limit switch can be,

45-second screwdriver test

Check the advantages of MICRO's basic switching unit in just 5 seconds! Stepped design allows extra space for easy wiring. Precision switching unit is self-contained, factory adjusted and replaceable. Heavy-duty #8 screw-type terminals.

ACTUAL SIZE

The rugged simplicity of the MICRO SWITCH "LS" series offers many advantages where high adjustability, compactness and heavy-duty electrical capacity are needed. As you've just proven yourself, these switches can be fully adjusted in a matter of seconds, making change-overs much simpler and far less costly. Compact in size, they fit in many places too small for any other fully adjustable limit switch. Yet they are big in electrical capacity . . . made to handle the same electrical loads as much larger switches. The rugged aluminum-alloy housing protects the precision switching unit from physical damage, and the entire unit is completely sealed, oiltight and dust-proof to prevent fouling.

The many time and money-saving features of this switch are true of the entire family of MICRO SWITCH limit switches. Rotary-actuator heads may be mounted in any of four positions. All models of rotary-actuator switches can be set to be operated electrically in both directions; or only to the left or right. Lever arms adjust through 360 degrees. Roller levers may be faced in either direction. And roller plungers can be faced at 90° increments.

See the Yellow Pages for the name of the nearby MICRO SWITCH authorized distributor or branch office.

Call your nearby authorized MICRO SWITCH Distributor and ask him to show you the inside story. Ask for Catalog 84.

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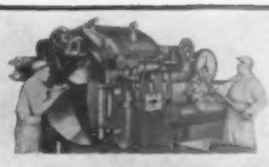

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FACTORY BOOKS

The manager as protagonist

You, gentlemen, are the villains—and the heroes—of this perceptive fictional analysis of the characteristics that separate the managerial men from the boys. Each of the 11 chapters in *The Men From the Boys* sketches the characters of a handful of managers, ranging from the clumsy incompetent to the smoothly efficient. They're types you'll recognize, because the writer, Perrin Stryker, is obviously drawing on extensive experience with managers, backed up by a keen insight.

It takes the author only the first few pages to make his salient point: Any list of "good managerial traits" is pretty arbitrary. And pretty unrealistic, too. It's the total package —a man's whole personality and character—that counts, and to judge potential ability on anything less is ridiculous.

While he's at it, Stryker has fun with something we're all tempted to do occasionally. He throws rocks at half-a-dozen sacred cows all too often assumed to assure good managers: aptitude tests, communications skills, management development programs, and—yes, even trade magazines. All this tends to deflate the concept of "scientific" management and the author consistently views perception (in any of the multitude of ways it can be displayed) as worth far more than pet techniques or current fads.

Fascinating as it is, we can't agree with the publisher that this is a "self-help" book. Presumably, following these fictional managers through their problems (to solution or disaster) is supposed to develop the reader's awareness of subtle character differences. It doesn't, of course, because people are much more complicated than those presented here, especially when the characters change to caricatures.

However, the fact that this isn't self-help material should not discourage any reader. Indeed, this fiction is delightfully different from the usual "improvement" books on management. It's skillfully organized into a collection of imaginary dialogues and diaries, letters and memos, which realistically portray management in action. It's absorbing, entertaining reading; a rare chance to see yourself as another sees you. (Reviewed by R. L. Grant.)

The Men From the Boys, by Perrin Stryker. Harper & Brothers, 49 E. 33rd St., New York 16. 237 pages. $3.95.

Operations research for men in the plant

This is not a book for the dilettante, although parts of it make interesting reading. Written by members of Johns Hopkins University faculty, *Operations Research and Systems Engineering* covers the combined fields extremely well for the operating man who has heard of these new "sciences" but never completely understood them.

As defined early in the book, OR and systems engineering are quite similar. Both try to solve the whole problem rather than just its parts. The difference is in the method of approach: OR is interested in making procedural changes to solve the problem; systems engineering emphasizes equipment changes.

The book is divided into three logical parts: perspectives of the two systems, the methodologies involved, and typical case studies. For a general understanding of the field, the reader can stop after the first seven chapters. These tie together Frederick Taylor's early scientific management and modern OR and systems engineering. But for details on statistical quality control, queuing theory, linear programing, simulation, and other tools of the trade, the reader should go on to the second part of the book. It will be rewarding. The section on the theory of games makes interesting reading, for example. Afterwards, the ability to relate operating decisions to gaming principles is not difficult to attain.

Turn the page

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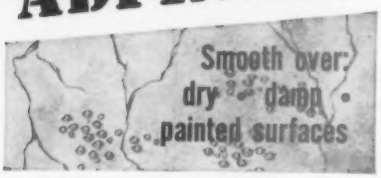

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But as one contributor warns, "These new approaches (OR and systems engineering) breed their own false efficiency experts who concern themselves only with the tools, forgetting the over-all concepts."

To distinguish the false prophet from the true practitioner of these new "sciences," just read this book.

Operations Research and Systems Engineering, edited by Charles Flagle, William Huggins, and Robert Hoy. The Johns Hopkins Press, Homewood, Baltimore 18, Md. 889 pages. $14.50.

Old-fashioned success

Here's an autobiography that offers a refreshing change of pace from the current crop of generally unexciting success stories. R. G. Le Tourneau is the modern-day equivalent of Horatio Alger, leaving school at the age of 14 and going on to become the undisputed leader of the gigantic earth-moving industry. His story in *Mover of Men and Mountains* is interesting, stimulating, and makes quick and easy reading.

Le Tourneau credits his success to two things: a unique partnership with God, and a bold, impatient imagination. To illustrate the latter, he says, "One thing I've learned about engineering is that if you ever are ready to rest on your laurels, you sit down on a chair that isn't there. You can't, as I was told to do, 'put your idea on ice.' If it is that good, and you don't develop it first, you can be sure someone else will thaw it out and develop it before you."

The book's conclusion contains several educated guesses about the potential extensions of the earth-moving and heavy-equipment industry. An example: A snake-like portable belt conveyor handling 100 tons of dirt a minute will be self-feeding and self-distributing. "Such a machine would be able to roll across a desert digging a canal and leveling the dirt behind it almost as fast as the water could follow." (Reviewed by Oswald Stewart.)

Mover of Men and Mountains, by R. G. Le Tourneau. Prentice-Hall, Inc., Englewood Cliffs, N. J. 282 pages. $3.95.

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The wisdom of the second course is daily becoming apparent to specialty manufacturers, almost without number. One of them is the Densal Manufacturing Corporation of West Springfield, Massachusetts—producer of metal-etched and lithographed instrument dials and name plates.

Business is good at Densal—so good that overtime is constantly required to keep pace with orders. But in hot weather, when 3 P.M. shutdowns were unavoidable, overtime was impossible. So management decided that worker productivity—not expansion—was the key to increased production.

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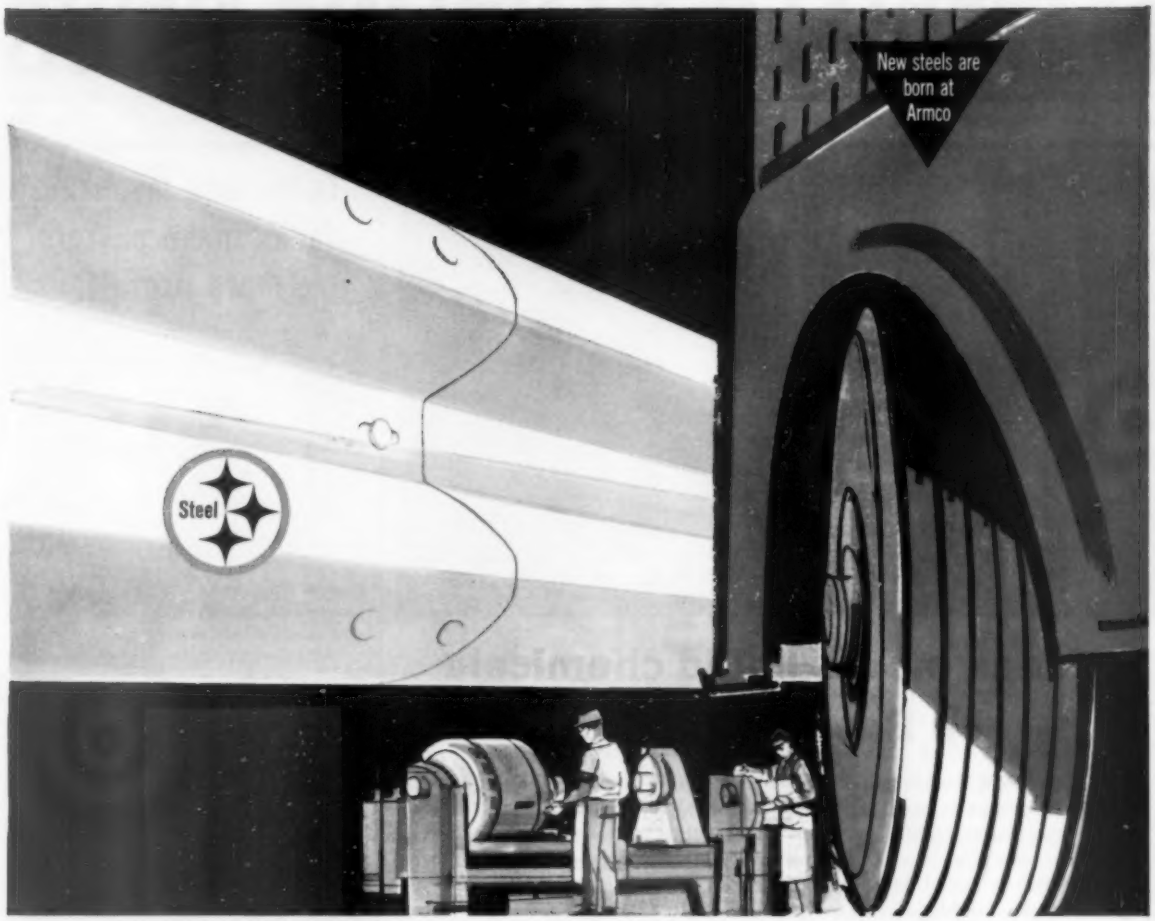
Clark Equipment Co., Industrial Truck Div., Battle Creek, Mich.

Films for Industry (1960-61) is a 24-page catalog listing more than 400 U. S. Government sound films and strips. Contents are classified by subject. For copy, write:
United World Films, Inc., 1445 Park Ave., New York 29.



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New Light-Gage Armco Guardrail Is Easier to Handle, Easier to Install

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All in all, this new Armco Guardrail is lighter, easier to handle, easier to install. For the first time it provides the means for protection of plant property, parking lots, plant entrances, expensive machines and other key equipment, with a product especially made for off-highway service. You buy less steel to do the job. It's maintenance-free, too. This new light-weight Armco FLEX-BEAM is protected from rust by a durable hot-dip zinc coating.

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MATERIALS-HANDLING NEWS

NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Kodak moves liquid chemicals on Bassick Casters

At the Kodak Park Works plant of Eastman Kodak Company, small quantities of chemicals must be gently and safely moved from one production area to another. Bassick is proud to have been selected as the supplier of the casters used in this operation. The operator above is adjusting the flow of chemicals that will be used in the manufacture of photographic paper—just one of the many high-quality Kodak products that use chemicals.

Locks and levelizing jacks make casters more useful!

Bassick truck locks and swivel locks hold castered equipment like scaffolds or machine tools in any desired position.

A Bassick levelizing jack offers an easy way to stabilize or level heavy portable equipment. Through the development of such "accessory" equipment, Bassick helps make materials handling easier, safer and more efficient.

Your local industrial distributor who handles Bassick casters will be glad to show you how casters will help you solve your materials handling problems. He has a convenient stock of Bassick Casters as near as your telephone.

Corrosion Resistant Sanitary Casters

Modern materials and advanced design ideas have enabled Bassick to help solve many difficult materials handling problems. Corrosion resistant casters, for example, were developed specially for use in corrosive conditions—and where maximum sanitation is imperative. You'll see them in chemical plants, food plants, packing houses and many similar locations. They also feature a smooth exterior which won't pick up dirt, dust or food particles. Easy to keep clean, too, because there's plenty of room around wheel, plate, horn and other parts. Write for Bulletin AJI-60.

Series "BB" Rigid Series "BA" Swivel

At Cross Brothers Plant, Philadelphia, Pennsylvania.

Cross Brothers have the right steer on casters

The meat's tender, but the movement problem is tough. Slippery sawdust floors make movement tricky. Heavy loads make "load guidance" difficult. Temperature changes between cold storage and work areas make maintenance a problem.

But, Bassick designs casters to *overcome* materials handling problems. Series "BA" and "BB" casters, for instance, are made of corrosion resistant, easy-to-clean aluminum. Notice the smooth exterior? No places for dirt, dust or food particles to lodge or cause trouble. And heat treated aluminum won't rust even when caster is steam cleaned. Design like this enables Bassick Casters to meet the most unusual floor conditions, load requirements and working environment with economy and efficiency. 0.33

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

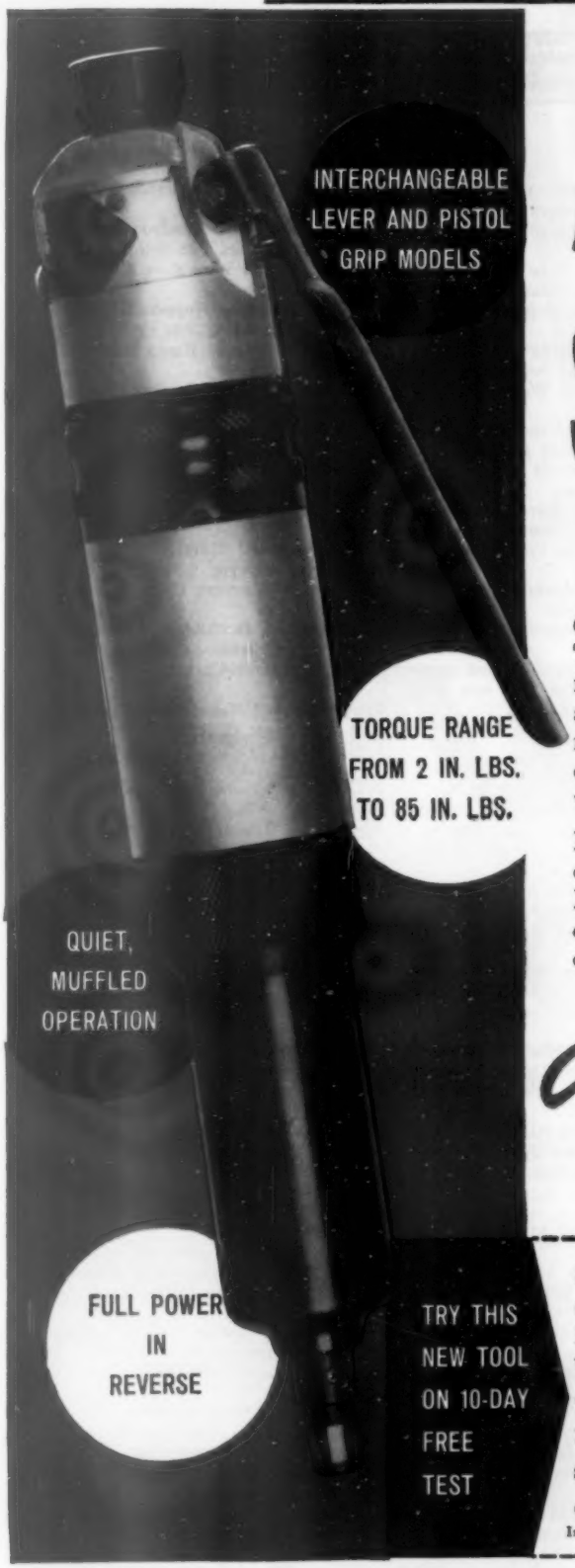
Sweet's

Symbol of SW Excellence

Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

For more facts Circle 532 on Reader Service Card

For new, set-it-and-forget-it fastener control...


INTERCHANGEABLE LEVER AND PISTOL GRIP MODELS
TORQUE RANGE FROM 2 IN. LBS. TO 85 IN. LBS.
QUIET, MUFFLED OPERATION
FULL POWER IN REVERSE
TRY THIS NEW TOOL ON 10-DAY FREE TEST

ACCURATE SMOOTH

NEW MASTER POWER TORQUE LIMITER

One screw or 1,000, Master Power's new Torque Limiter gives you the never-failing, fool-proof torque control that prevents damage to screws, nuts or work—stops costly reworking—lengthens bit life many times over—eliminates need for hand torque wrenches.

Before you settle on any assembly tool, try our free 10-day trial! Use the new Torque Limiter on your jobs. See how Master Power *customizes* its tools to your needs. Mail the coupon today.

Master Power

CORPORATION • BEDFORD, OHIO

A Black & Decker Subsidiary

Look under TOOLS-PNEUMATIC HOISTS-PNEUMATIC

Master Power DEPT. 508, BEDFORD, OHIO

Gentlemen: I want to run a Master Power 10-Day Tool Test on your new Torque Limiter. I understand there is no obligation.

Company.....

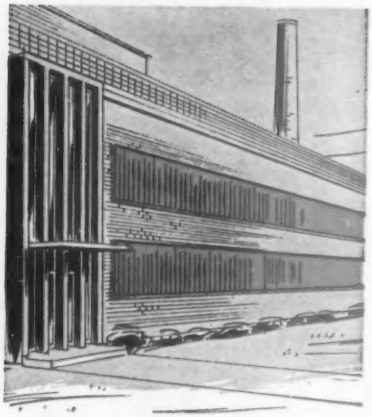
Individual.....

Street.....

City.....Zone.....State.....

In Canada: Master Pneumatic Tools (Canada) Ltd., Rexdale, Toronto, Ont.

For more facts Circle 533 on Reader Service Card



For unbreakable windows and skylights

NEW

Stylux BY BUTLER ®

LONGER-LASTING SHATTERPROOF PLASTIC PANEL

End window breakage and glare, cut glazing expense with new weatherproof Stylux, the longer-lasting panel. New, improved resins and fiberglass mat plus superior bonding process create a premium-quality panel with up to 90% light transmission. Costs less to install, too, with new 4-ft. coverage widths. Also all standard sizes. Get literature, specs, from your Building Supply Dealer, Glazing Contractor or write direct.

Stylux BY BUTLER ®

Plastics Department,
Buildings Division
BUTLER
MANUFACTURING
COMPANY
Dept. 110, 7400 East 13th Street
Kansas City 26, Missouri

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

BUILDING

275—Plant Sites. Specific details on opportunities and advantages of plant locations. Commonwealth of Kentucky.

276—Greenville, Pa. Free booklet and other information on industrial site locations. Reynolds Development.

277—Floor Plate. Bulletin SD-S10 contains complete data on heavy-duty diamond floor plate. Alan Wood Steel Co.

278—Roofing. Detailed roof survey report is available for your guidance. No obligation. Johns-Manville Corp.

279—Acoustic Panels. Free folder tells how to solve sound control problems fast, economically. The Eckel Corp.

280—Plywood. Specifications on high-density overlaid exterior plywood and applications. Georgia-Pacific Corp.

281—Plastic Panels. Literature and specifications. Standard sizes plus new 4-ft. coverage widths. Butler Mfg. Co.

MECHANICAL

282—Gear Drives. Bulletin 3100 on all-steel motoreducers gives data on hp. range, output speeds. Falk Corp.

283—Bearings. Bulletin No. 100 provides information on bearings with seals of Teflon. Hoover Ball & Bearing Co.

284—Adjustable Speed Drives. Bulletin 3650 contains complete data on new magnetic drive. Louis Allis Co.

285—V-Belt Drives. Write for free copy of "The Modern Way to Design Multiple V-Belt Drives." Gates Rubber Co.

286—Bearings. Catalog AD-1258 covers line of radial and thrust cylindrical roller bearings. Rollway Bearing Co.

MATERIAL HANDLING

287—Casters. Bulletin AJI-60 on Series "BB" Rigid and "BA" Swivel. Corrosion-resistant. The Bassick Co.

288—Conveyor Screws. Book 2989 gives complete facts on component units for screw conveyors. Link-Belt Co.

289—Batteries. Bulletin on ironclad batteries with capacities from 400 to 1280 amp.-hr. Electric Storage Battery Co.

290—Casters. Full information on new 90 series caster in stationary and swivel types. Darnell Corp., Ltd.

291—Conveyors. Revised handbook lists dozens of ideas on solving handling problems. The Rapids-Standard Co.

292—Slings. New handbook tells all about slings—types, dimensions, and rated loads. Union Wire Rope Corp.

293—Self-Dumping Hoppers. Tells how to cut scrap-handling costs by 50%. Hoppers come in 8 sizes. Roura Iron Works.

294—Steel-Shelving. Catalog gives complete facts, structural and assembling features. Borroughs Mfg. Co.

295—Adjustable Racks. Literature gives data and structural features of open-end racks. American Metal Products Co.

296—Conveyors. Catalog lists line of engineered conveyor systems for varied applications. Lamson Corp.

297—Trucks. Booklet, "Methods and Ideas," and bulletins on maker's line are available. Barrett-Cravens Co.

298—Cranes. Catalog lists complete line with wide range of spans and capacities. Euclid Crane & Hoist Corp.

299—Steel Strapping. Booklet: "Signode M-20 Series Standard Power Strapping Machines." Signode Steel Strapping Co.

300—Scales. Condensed Catalog 2001 gives complete data on line of weighing scales. Toledo Scale Corp.

MAINTENANCE

301—Paint. "How to Put Color to Work" (28 pages) covers maintenance painting. E. I. du Pont de Nemours & Co.

302—Masonry Adhesives. Bulletins describe adhesive coatings for new or old masonry surfaces. Swift & Co.

303—Paint. Booklet, "How To Save Safely When Painting Your Plant," is free for the asking. Sherwin-Williams Co.

304—Lamps. Lighting Maintenance Manual (48 pages) contains many cost-saving hints. Champion Lamp Works.

305—Machine Mounts. Bulletin tells low-cost way to get improved machine performance. Clark-Cutler-McDermott Co.

306—Scrubber-Vacuum. Literature gives complete data on battery-powered floor machines. Finnell System, Inc.

307—Steam Cleaner. Facts on high-pressure jenny, with capacities 35 to 360 gal. per hour. Homestead Valve Mfg. Co.

Turn the page

BUY THE LOWEST-COST BATTERY YOU CAN FIND

New 800 amp-hr Model TGS Exide-Ironclad. Same outside dimensions as former 720 amp-hr battery. Other new 22⅝-in. high Exide-Ironclad Batteries in capacities from 400 to 1280 amp-hr.

In the whole world, only the new Exide-Ironclad TG Super gives you so much battery power for so little. Packs 11% more power with no increase in size. That means your present trucks can do more work every shift. And this more powerful battery actually costs you less per amp-hr. Same long Exide-Ironclad life potential for low annual cost. Search all you want. You'll discover, as most others have, that the Exide-Ironclad is truly the lowest-cost battery you can find. Write for our new bulletin. Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

New Exide battery for small industrial trucks and personnel carriers. Model 3-KCS-9. Features new-design tubular positive plate. Up to 30% more capacity than automobile batteries. Up to four times their average life. Fits same compartment. Write for new bulletin.

Exide®

TOOL ENGINEERS' HANDBOOK

A monumental reference volume covering all phases of planning, control, design, tooling, and other operations involved in the mechanical processing of finished products. Prepared with your needs in mind, it brings you basic factual data collected from responsible sources—dependable answers you need in making every variety of tool engineering decision. **By American Society of Tool and Manufacturing Engineers. F. W. Wilson, Editor-in-Chief. 2nd Ed., 2289 pp., 1709 illus., 605 tables, $19.50**

A-C MOTOR-CONTROL FUNDAMENTALS

Explains the fundamentals of a-c motor controls—guides you in developing control circuits that effectively perform the functions required in today's electrical fields. Gives you a sound background for working with control circuits—discusses typical areas where motor control is used—and analyzes the components essential to control circuits. **By R. L. McIntyre, Training Director, Joint Apprenticeship and Training Committee for the Electrical Contracting Industry, Houston, Texas. 248 pp., 139 illus., $5.95**

THE GREAT ORGANIZERS

Just Published. Tells how the master organizers of Du Pont, General Motors, National Steel, and Westinghouse led their companies to new heights of success. Here are the methods they used—explained in detail—to help you with profitable organizational planning in comparable situations. **By Ernest Dale, Management Consultant. 271 pp., 12 charts, $5.95**

MANAGEMENT PRACTICES

Just Published. A fresh look at management principles and practices, emphasizing development of creative human effort in the business organization. Covers delegating, directing, coordinating, communicating, and more. **By Richard C. Anderson, Org. Counsel, Lockheed Aircraft Corp., Sunnyvale, Calif. 312 pp., illus., $7.00**

FREE EXAMINATION

McGraw-Hill Book Co., Dept. FAC-8
327 West 41st St., New York 36, N. Y.

Send me book(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon—same return privilege.)

- ☐ ASTME—**Tool Engineers' Handbook**, $19.50
- ☐ McIntyre—**A-C Motor Control Fund.**, $5.95
- ☐ Dale—**The Great Organizers**, $5.95
- ☐ Anderson—**Management Practices**, $7.00

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ADVERTISERS' LITERATURE

Begins on page 246

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

308—Tramrails. Booklet 2022 on tramrail systems for building maintenance. Cleveland Crane & Engineering Co.

309—Lubricator. Brochure gives complete data on automatic lubricator for trolley conveyors. Aro Equipment Corp.

310—Pump Oiler. Latest catalog, just off press, shows full line of safety containers. Eagle Mfg. Co.

311—Lubricants. Free data book is a helpful treatise on lubrication. Lubriplate Div., Fiske Bros. Refining Co.

312—Paint. Booklet, "Color Dynamics," explains what it is and how it can be applied. Pittsburgh Plate Glass Co.

313—Maintenance Truck. Here's job data on maker's F-10 motorized platform truck for varied uses. Prime-Mover Co.

ELECTRICAL

314—Safety Switch. Latest bulletin gives complete details and performance features. Square D Co.

315—Motors. Here are details on custom-built air-cooled polyphase motors, 50 or 60 cycles. Valley Electric Corp.

316—High-Voltage Cable. Bulletin DM-5606 has data on butyl-insulated power cable. Anaconda Wire & Cable Co.

317—Magnetic Starter. Publication LO-40-Q211 for full story on size 00 a-c starter. Cutler-Hammer, Inc.

318—Switchgear. Illustrated Bulletin 2801-2A covers new metal-clad type. I-T-E Circuit Breaker Co.

PRODUCTION

319—Metal Cleaning. Free: "Solvent Degreasing—What Every User Should Know." Detrex Chemical Industries, Inc.

320—Signs/Nameplates. Booklet FF-1 describes engraving machine to make them. New Hermes Engraving Machine Corp.

321—Photo-Drawings. Booklet gives details on techniques and the savings they make possible. Eastman Kodak Co.

322—Drill Presses. Catalog shows 61 machines, 302 models, and over 1400 accessories. Rockwell Mfg. Co.

323—Photo Panels. Booklet describes time-saving preparation directories, catalogs, etc. Acme Visible Records, Inc.

Turn the page

ANSWER

to Worthington Hidden Value Puzzle

The fictitious "hidden value" on the back cover is, of course, the "Full Floating Wrist Pin" in the piston. This construction is found only on light duty compressors with single acting cylinder construction.

Because all Worthington horizontal compressors are heavy duty machines, they are built with the crankshaft, connecting rod and crosshead linkage system illustrated above. It changes rotary shaft motion to linear piston motion without side thrusts on the cylinder walls. Thus wear is reduced and compressor life increased. Worthington Corporation.

precision CONTROLS BEST

It's "Precision-eered"! Every part of the PMC fail-proof, miniaturized, trouble-free, 2-component multiple-control is your guarantee of quality that can't be matched.

Prove to yourself what more than 300,000 installations and an estimated 1,000,000 "light years" in the field have proved to other users of multiple-controlled lighting.

Specify PRECISION—to make *low first cost your last cost!*

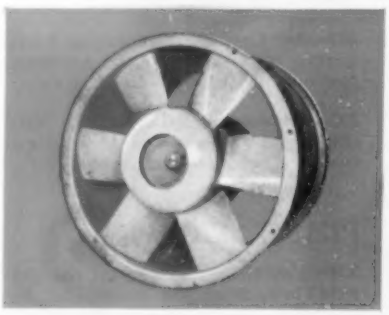
pmc **PRECISION MULTIPLE CONTROLS**

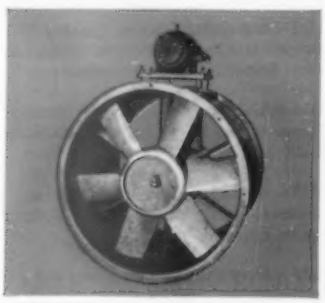
Pioneers in Automated Lighting Control

233 CHESTNUT RIDGEWOOD, N. J.

Circle 536 on Reader Service Card

New Features at Lower Cost Offered by New Designs of Wing Roof Ventilators and Fan Equipment





Three new distinctively designed roof ventilators offer Wing's famous sturdy construction plus many new features at lower prices. Some of the unique features of these new models are nylon damper bearings, rubber and magnetic snubbing of dampers for weathertight closing and flutter elimination, and hinged windguards.

Now you, too, can benefit from the experience Wing has gained over many years as a builder of fan equipment to the exacting requirements of maritime and military specifications. The new Wing vaneaxial and tubeaxial direct and belt-driven models provide top quality and distinctive design features at lower prices than before.

Write today for information on this new equipment and how it can solve your summer ventilating problems.

WC181

WING

L. J. WING MFG. CO.
DIVISION OF AERO SUPPLY MFG. CO. INC.
162 VREELAND MILLS ROAD, LINDEN, NEW JERSEY
FACTORIES: LINDEN, N. J. AND MONTREAL, CANADA
IN EUROPE: WANSON, HAEN-NORD, BRUSSELS, BELGIUM

For more facts Circle 537 on Reader Service Card

Professor Lucius von Hausen, of aeronautics fame, reads in a balloon.

"Sort of keeps me on top of things," he says. Fair enough . . . but other engineers and executives prefer to read with their feet on the ground, especially when they're reading about business. Remember, a good place to read is a good place to think . . . and if you pay engineers and managers to think, encourage them to do more reading. Like so many successful men who read their "most useful" McGraw-Hill publications, they'll find the best place . . . home or plant, office or hammock. But wherever they read, remember, you share in the rewards.*

**Yes, when they read, you profit, too. Write on your business letterhead for a personal copy of booklet, "The McGraw-Hill Engineered Reading Program."*

ADVERTISERS' LITERATURE

Begins on page 246

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

324—Manufacturing Facilities. Information on production capacities of Northern plains area. Northern Natural Gas Co.

325—Product Finishing. Brochure lists line of automatic painting machines, accessories. Conforming Matrix Corp.

326—Plier-type Tools. Hand Tool Manual contains industrial application data and case histories. Sargent & Co.

327—Work Center System. Handbook (56 pages) is packed with money-saving production ideas. Alden Systems Co.

328—Data Processing. Brochure on use of print-punch tickets and machines for data processing. Dennison Mfg. Co.

329—Counters. Catalog 200 lists complete line of industrial counters for every use. Durant Mfg. Co.

330—Heat Exchangers. Bulletins 120, 124, and 135 give complete data and varied applications. Niagara Blower Co.

331—Photoelectric Control. Brochure NR-8 gives data on automatic industrial processes. Standard Instrument Corp.

332—Air Controls. Booklets on fundamentals of air circuitry and pneumatic control. Westinghouse Air Brake Co.

333—Schedule Board. Booklet X100 (24 pages) shows application of visual control board. Graphic Systems.

PLANT SERVICES

334—Unit Heater. Catalog 158 has complete information on steam and hot water unit heaters. Modine Mfg. Co.

335—Industrial Gloves. Catalog G-3 lists complete line, with sizes, gages, colors, etc. Seiberling Latex Products.

336—Meter for Liquids. Literature on meter for handling liquid chemicals, fertilizers. Badger Meter Mfg. Co.

337—Air Conditioning. Booklet, "Will factory air conditioning pay off for me?" upon request. Carrier Corp.

338—Dust Filter. Covers multi-bag filters and complete line of dry collection equipment. Dracco Div., Fuller Co.

339—Unit Heater. Catalog SA-5900 gives data on full line, plus new automatic venter. Reznor Mfg. Co.

Turn the page

HOW DU PONT PUTS THE POWER OF COLOR TO WORK FOR YOU

Horace Jordan is a Du Pont "Color Counsellor"—one of a staff of specially trained sales representatives whose years of experience qualify them to bring you expert, on-the-job guidance in solving problems of maintenance painting. Let Horace tell you himself how Du Pont's system of Color Conditioning can put the power of color to work for you—at a profit:

"There are *two* ways you can economize on maintenance painting. Your first consideration, of course, is the selection of quality finishes. When you specify Du Pont paints, you're getting finishes that are tough, durable, just right for every job. Believe me, there's no better assurance of lasting protection and long-term economy.

"*Production* savings are something else again—a bonus you get when you paint according to Du Pont's system of Color Conditioning. You see, Du Pont developed this system to create ideal conditions of work or study in every type of plant and institution. Scientifically applied—often under our personal supervision—Color Conditioning harnesses the power of color to promote safety, raise employee morale, boost production. Result: *an extra bonus of savings!*"

If you'd like to discuss your maintenance painting problem with someone who knows his business, there's a man like Horace Jordan near you. Call him at your local Du Pont district sales office. For more information, plus the 28-page booklet, "How to Put Color to Work," write: E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. F-68, Wilmington 98, Delaware.

* * *

Horace Jordan is a paint expert whose 30 years of experience have helped him solve maintenance problems for a variety of institutions and industries. As a Du Pont "Color Counsellor," he's seen Color Conditioning pay off for countless plants, office buildings, schools, churches and banks. In demand as a speaker, he recently delivered—in a single month—*32* talks on color and its application, at the request of the Department of Home Economics of his state.

DU PONT COLOR CONDITIONING PAINTS

DU PONT

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

Maintenance Ideas

They'll save dollars for you—dollars that will add up fast. And where can you find these ideas? In FACTORY reprints, of course. The list below tells you the titles we carry in stock. To get the ones you want, order (by code number and title) from FACTORY Reader Service, 330 W. 42nd St., New York 36. Send cash or check. Or ask us to bill you. Now scan the list below.

35 CENTS EACH

A15 18 Ways to Cut Maintenance Costs
A119 Making Your Dials Read Right
A127 Plant Site Selection Guide
A129 Slicing Maintenance Labor Costs
A131 Better Way to Rate and Pay Maintenance Workers
A139 What Planned Maintenance Means to Me
A148 18 Checks on Maintenance Costs
A158 16 Soft Spots in Maintenance Costs
A159 How to Make a Maintenance Audit
A173 How to Audit Obsolescence
A177 How to Divvy Up New-Plant Money
A179 What You Will Pay for What You Want in Your New Plant
A183 Maintenance Plan to Fit Any Plant
A201 A Pro Looks at Maintenance Cost Reduction
A224 2 New Ways to Measure Maintenance Efficiency
A233 Critical Path Scheduling
A236 Tips on Low-Cost Buildings

50 CENTS EACH

A20 Measure Maintenance Performance
A21 Mechanized Maintenance Control
A22 The Management of Maintenance
A24 Keep Your Plant Up—Costs Down
A25 How to Build a Maintenance Program Now
A26 Maintenance Control That Really Controls
A27 How to Boost the Maintenance Department's Productivity
A28 What Should Maintenance Cost?
A29 How to Find & Control Your Maintenance Costs
A31 Best in Plant Maintenance
A33 Select the Right Floors
A34 Install Floors for Long Life
A35 Make Floors Last Longer
A106 Preventive Maintenance
A180 Better Maintenance Stores (3 articles)
A187 What Industry Is Spending for Maintenance
A193 159 Ways to Build Low-Cost Maintenance into Your Plant
A211 How To Organize for Better Maintenance

PLANT SERVICES

35 CENTS EACH

A161 Those Hidden Handling Costs
A166 How to Save Real Money on Power
A169 Let Lights Burn — or Turn 'em Off?
A171 The Whole Story on Water Costs
A178 Puzzled About Buying Motors?
A200 Hitting the High Cost of Handling
A202 16 Signs of Power Trouble
A205 Getting Your Best Plant Layout
A230 3 New Tools for Better Plant Layout

50 CENTS EACH

A43 Adopt the Best in Plant Layout
A134 Static Electricity — $100-Million Headache
A162 Electrical Management & Maintenance Practices Today (Survey of 329 plants)
A221 Spot Heating
A231 Scrap Recovery

ADVERTISERS' LITERATURE
Begins on page 246

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

340—Dust Collector. Illustrated literature on self-contained single machine types. 46 models. Aget Mfg. Co.

341—Fans. Catalog 859 gives full descriptive data and applications of Type AF dynafoil fans. Clarage Fan Co.

342—Industrial TV. Free copy of closed-circuit TV system planning guide for varied applications. Philco Corp.

243—Factory Furniture. Catalog illustrates diversified line of steel equipment. Lyon Metal Products, Inc.

344—Valves. Catalog 91024 lists line of 2-, 3,- 4-way electrically operated valves. Airmatic Valve, Inc.

345—Aftercoolers. Bulletin 714 gives full details on maker's line of aftercoolers. R. P. Adams Co.

346—Compressors. Bulletin 185 lists complete line. Six stroke sizes—23 models. Clark Bros. Co.

"Best sellers" for plant operations

Some of the most popular reprints of FACTORY articles are listed below. If you haven't read them, you can get copies from: FACTORY Reader Service, 330 W. 42nd St., New York 36. Send cash or ask us for a bill.

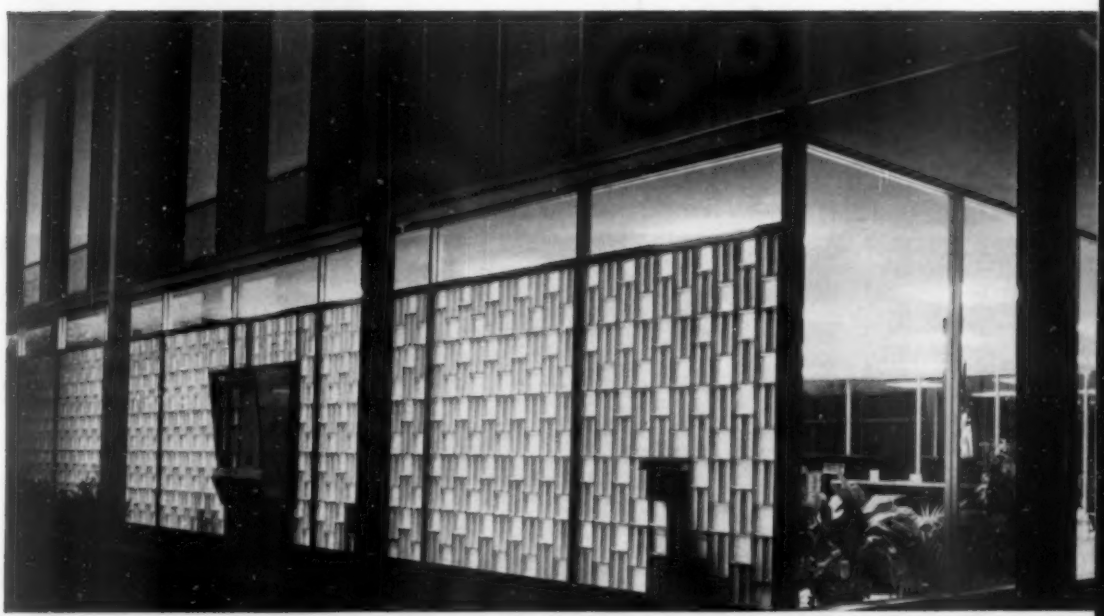
35 cents each

A73 Work Sampling Without Formulas
A118 How Many Time Studies to Take
A127 Plant Site Selection Guide
A165 Easy Way to Sample Work
A167 Quick Way to Measure Long Jobs
A186 Measuring Hard-to-Measure Jobs
A205 Getting Your Best Plant Layout

50 cents each

A74 Work Sampling
A76 Motion-Time Standards
A77 Methods-Time Measurement
A78 How Good is MTM?
A153 Tips to Successful Discipline
A155 Work Simplification
A170 Handling the Problem Worker
A187 What Industry is Spending for Maintenance Today
A192 Work Measurement and Wage Incentives Today
A212 Work Sampling Today

See why Pittsburgh Corning Products make the things you build look better, last longer, cost less



example: PC 4x12 Glass Blocks to add new eye appeal to the functional benefits of the daylight wall

Strong eye appeal has taken its place beside function as an important requirement in plant and office building design. That trend has called for new flexibility of materials—to add visual vitality to basic function. That is what the PC 4 x 12 is all about.

Here—in a striking dimensional variation of the PC Glass Block—you gain almost limitless capacity to inject new visual vitality into the daylight wall. Take for example the wall design displayed above. Creative interpretation of the light transmitting wall presents an attractive contemporary flair without sacrificing the basic value of functional use of transmitted light.

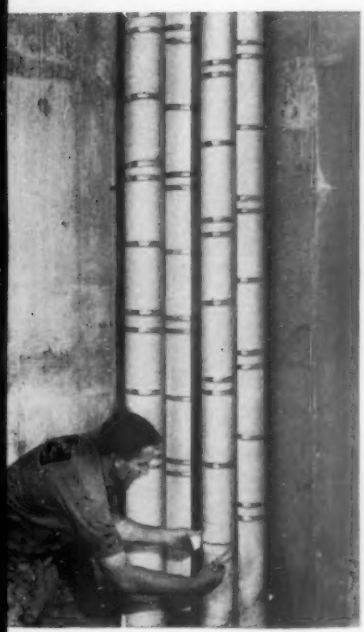
The PC 4 x 12 represents Pittsburgh Corning's constant attention to your growing need for materials which free design from purely mechanical construction. (*Continued*)

Take advantage of the coupon on page three of this advertisement.

PITTSBURGH PC **CORNING**

For more facts Circle 540 on Reader Service Card

example: FOAMGLAS® Stay-Dry Pipe Insulation to design five important benefits into all building service lines



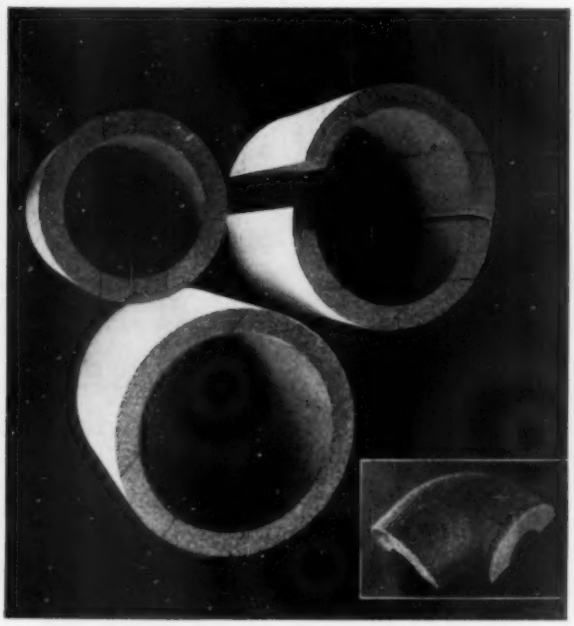
Insulation for building service lines—iced water, chilled water, low pressure steam or dual temperature—has frequently proved a maintenance headache. Now you can design away that headache with FOAMGLAS Stay-Dry Pipe Insulation and its combination of five critical benefits. First, since FOAMGLAS is incombustible and the jacket self-extinguishing, FOAMGLAS Stay-Dry Pipe Insulation substantially reduces fire hazards. Second, constant insulating value results from the absolute imperviousness of FOAMGLAS to all moisture. Separate vapor seals are unnecessary.

Next is the elimination of all weak spots in piping runs. The extraordinary compressive strength of FOAMGLAS prevents slump or sag on the highest vertical runs and saddle supports can never puncture the insulation. Fourth, the insulation is furnished with a factory applied Kraft-foil jacket. And fifth, all these benefits can be applied to total piping systems since FOAMGLAS Stay-Dry Pipe Insulation is available in sizes from ½″ copper tubing to 12″ IPS with fitting covers and elbows to match.

PITTSBURGH CORNING

For more facts Circle 541 on Reader Service Card

Check the appropriate box on the coupon to obtain this brand new catalog containing complete specification and installation data on FOAMGLAS Stay-Dry Pipe Insulation.



PITTSBURGH CORNING CORPORATION
Dept. FF-80, One Gateway Center, Pittsburgh 22, Pa.

Please send me descriptive literature on the products checked below.

- ☐ FOAMGLAS Roof Insulation
- ☐ FOAMGLAS Low Temperature Insulation
- ☐ FOAMGLAS Insulation for Industrial Piping
- ☐ FOAMGLAS Stay-Dry Pipe Insulation for Building Service Lines
- ☐ FOAMGLAS Insulation for Curtain Wall Panels
- ☐ PC GLASS BLOCKS
- ☐ The PC 4 x 12 Block
- ☐ PC Color Glass Blocks
- ☐ FOAMSIL,® the Acid-proof Insulating Refractory
- ☐ PC Sculptured Glass Modules

Name _____

Company _____ Title _____

Address _____

City _____ Zone _____ State _____

ROTOR MIDGET GRINDER...

DEBURRS TWICE AS FAST ...pays for itself in 4 weeks

Job. Deburring fillet weld of spud inside of hydraulic cylinders. Formerly done with electric tools and hand files.

With Rotor M 1118 Grinder . . . equipped with mounted point or rotary file . . . does job in half former time. Savings paid for this 20,000 rpm Rotor air tool in less than 4 weeks.

Ask for demonstration of this midget grinder, and other cost-cutting Rotor air tools. Complete line described in Bulletin 53C, free on request.

Courtesy of Universal Hydraulic Co., Willoughby, Ohio

ROTOR AIR TOOLS: Assembly Tools • Drills Small Wheel Grinders • Straight Grinders Vertical Grinders • Scalers • Chippers Rammers • Special Tools • Air Motors.
ROTOR HIGH-CYCLE ELECTRIC TOOLS: Grinders • Polishers • Sanders.

Here's the RIGHT TOOL for YOUR job!

ROTOR TOOLS

The Rotor Tool Company • Cleveland, Ohio
SUBSIDIARY OF THE COOPER BESSEMER CORPORATION

For more facts Circle 542 on Reader Service Card

IT IS no exaggeration to say that there is no industry in America for which adequate water would not be readily available in Kentucky.

A total of 664 miles of Kentucky's northern boundary is formed by the Ohio River, one of America's major sources of water for industry. This river alone flows more than 617,000 gallons per second, average, where it first touches Kentucky—nearly 2,000,000 gps where it leaves the State. Kentucky's western boundary is the Mississippi; its eastern boundary, the Big Sandy River.

And in between, there's much, much more—the Cumberland, the Tennessee, Green, Big Sandy, Kentucky, and Licking rivers. *Kentucky receives five times as much water each year as its 40,400 square miles normally get from rainfall*—and this doesn't include Kentucky's share of the Mississippi. And other billions of gallons *beneath* Kentucky's lands also help give this State one of its most impressive assets.

No matter what volume of water your industry requires, Kentucky can fulfill all your present and future needs. Detailed facts and figures on request.

Address:

Lieutenant Governor Wilson W. Wyatt, or
E. B. Kennedy, *Commissioner,*
Department of Economic Development,
500 State Capitol Building, Frankfort, Kentucky

COMMONWEALTH OF
KENTUCKY

WHERE BIG THINGS ARE HAPPENING

Industrial expansion has been 43% greater in Kentucky since World War II than in the Nation as a whole. Why? Because literally hundreds of companies have discovered that Kentucky offers more opportunities for progress and profits.

And now a far-reaching new program has been put into effect to stimulate even greater development. Legislation favorable to Kentucky industry has been enacted . . . better schools and other needed improvements are being made possible through a new 3% sales tax (with many exemptions for industry—and which has enabled Kentucky to reduce its personal income tax by 36%) . . . *one of the most complete industrial financing programs in the Nation* is an actuality (with both privately and publicly financed lending agencies for new and expanding industry) . . . state authority has been set up for building desirable airstrips and access roads to plant sites.

Big things are happening in Kentucky. We will send you specific details on request.

The Bostitch Economy Man can give you quick and effective answers to many knotty production fastening questions.

One reason is that he has over 800 staplers and more than 200 staples to work with. Quite possibly, he'll be able to suggest a way to give you benefits beyond those you expect.

For example, if you need faster fastening, he may be able to give you more speed with greater fastening strength. Or he may give you exactly the kind of fastening you need at a lower cost than you'd expect.

When you need fastening information or help, call in your Bostitch Economy Man. He'll be glad to help you with data from the largest source of facts in the stapling industry. He's listed under "Bostitch" in your phone book. Or, write us direct if you wish.

Fasten it better and faster with

With every Bostitch machine you get...

assurance of the right combination for your needs from 800 staplers and over 200 staples . . . an extra margin of quality . . . nation-wide parts, service and technical aid . . . dependable supply from the industry's most modern factory . . . and we stand behind every Bostitch machine, making sure it operates to your complete satisfaction.

BOSTITCH®

STAPLERS AND STAPLES

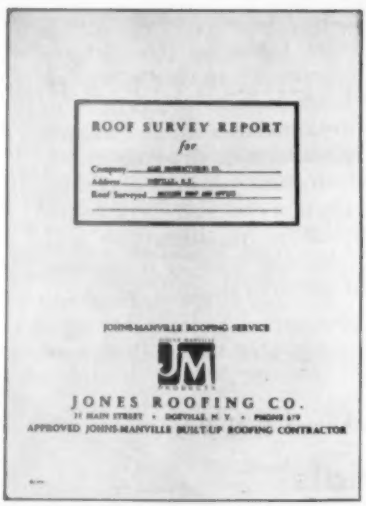
608 BRIGGS DRIVE, EAST GREENWICH, RHODE ISLAND

FACTORY

For more facts Circle 544 on Reader Service Card

What these trained eyes see may save you thousands of roofing dollars!

YOUNG ROOFING CO., ST. LOUIS, MO.



ABSOLUTELY WITHOUT OBLIGATION— *a detailed report like this covering your roof and what it needs now or later.*

Let a Johns-Manville approved roofing contractor make the report for you... without the slightest obligation

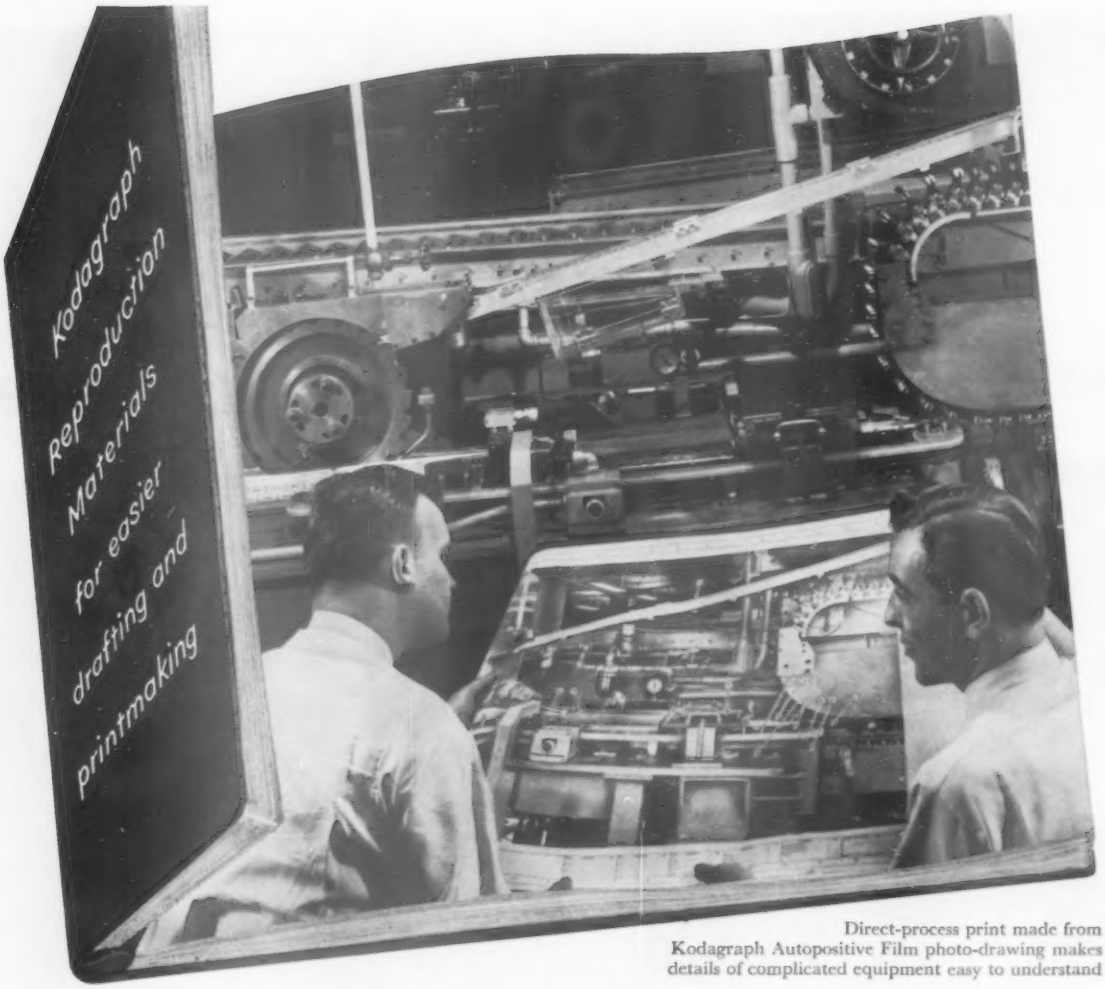
It takes a practiced eye to spot roof troubles that may cost you thousands of dollars later. The approved Johns-Manville Roofing Contractor near you can locate trouble before it happens . . . and knows what to do about it.

A J-M Roof Survey—available to you without obligation—covers visible defects. More important, it points out future troublesome spots. And it shows you clearly and concisely what to do and what it will cost using quality Johns-Manville Roofing Products . . . and the services of your J-M contractor.

Put his trained eyes to work on your roof today. He's listed in the Yellow Pages under "Roofers." Or write Johns-Manville, Box 158, Dept. FA-8, 20 E. 40th Street, New York 16, New York.

JOHNS-MANVILLE

J-M 7★ 7 STAR VALUE PRODUCTS



Direct-process print made from Kodagraph Autopositive Film photo-drawing makes details of complicated equipment easy to understand

One picture better than 1,000 lines

Low-cost photo-drawings save countless hours of redrafting, improve communications, speed construction

"Let's take some pictures"—that's the first step today in many drafting rooms *when* additions or revisions are called for in existing equipment; *when* equipment layout drawings must be made from engineering models; *when* assembly, wiring, or piping plans for machines or products must be created from a prototype.

After pictures are taken on these jobs—and countless others—it's an easy operation for your printroom or local blueprinter to make positive intermediates which combine desired negatives and your drawing forms.

Every detail on these prints is accurate, up-to-the-minute, and in desired perspective—easy for anyone to visualize. Just add dimensions, connecting lines or other new detail and your photo-drawing is ready.

Free booklet gives interesting details on photo-drawing techniques and the savings they make possible. Send for your copy today!

Graphic Reproduction Division, Eastman Kodak Company, Rochester 4, N. Y.

Kodagraph Reproduction Materials

For better line-for-line reproduction

Kodak
TRADE MARK

For more facts Circle 546 on Reader Service Card

For more facts Circle 547 on Reader Service Card ➤

Right, PPG insulation is easily cut to size on the job. Left, Foreman Charles W. Booth, of Acheson Sheet Metal Company, supervises installation of ductwork. PPG Neoprene-coated Duct Liner meets all requirements of NBFU Bulletins No. 90-A and 90-B for ducts, and bears the label of Underwriters' Laboratories, Inc.

The inside story on a hush-up job in Tampa

(with PPG Fiber Glass Insulation, of course!)

It will be quiet, as well as comfortable around the new State Agency Building at Tampa, Florida, because PPG Fiber Glass Insulation has been installed in the ductwork of the heating and air conditioning system.

Job foreman Charles W. Booth of Acheson Sheet Metal Company, Jacksonville, installers of the ductwork, reports that the long life-expectancy of PPG Neoprene-coated Fiber Glass is of great importance in the choice of this insulation, because of the difficulty of replacement in a duct system.

It's what's inside that counts!

Mr. Booth says that PPG Insulation has extraordinary sound-deadening qualities which eliminate fan noise, has excellent thermal-barrier characteristics, and low resistance to air flow. In addition to ease of handling and installation, it will not be affected by humidity, won't swell, rot or decay . . . very important in Tampa-types of climates!

Get best results with PPG

Available in a range of sizes, densities, and facings to meet any insulation specification. For more information, contact your nearest Fiber Glass Sales Office, or write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

Sales Offices: Atlanta, Boston, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Fort Wayne, Houston, Jacksonville, Kansas City, Los Angeles, Louisville, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis, Seattle and Washington.

FIBER PPG GLASS PITTSBURGH PLATE GLASS COMPANY

HEAVIER OUTSIDE WIRES mean great resistance to abrasion. FINER INSIDE WIRES mean excellent drum winding characteristics.

In REGULAR LAY ropes the wires are laid in a direction opposite to the lay of the strands. This provides stability even under severe operating conditions.

In LANG LAY ropes the wires and strands are laid in the same direction, providing exceptional flexibility and abrasion resistance.

Two ropes in one! Roebling Herringbone® Wire Rope is designed and made to wear better, work better, last longer than you can possibly imagine . . . unless you've tried it yourself!

Herringbone combines two pairs of Lang Lay strands with one pair of regular lay strands to give you maximum flexibility, good stability, mighty strength. Call your Roebling Distributor — or write for details to Roebling's Wire Rope Division, Trenton 2, N. J.

HERRINGBONE WIRE ROPE

ROEBLING

Branch Offices in Principal Cities
John A. Roebling's Sons Division
The Colorado Fuel and Iron Corporation

For more facts Circle 548 on Reader Service Card

When towels come one at a time they all get used

NEW Steiner Serva-Matic dispenser delivers one unfolded paper towel at a time. No buttons, cranks, levers or tear off required.

A few seconds will elapse before the next towel comes out of this Steiner automatic dispenser. Means the first towel will be used before the second can be taken. When this happens every time someone dries his hands you can see the result: Fewer towels are used . . . waste is reduced . . . towel costs go down (as much as 30%). All Steiner cabinets have an adjustable control you can set to dispense towels at the rate you want . . . at the best rate to keep washroom traffic moving and to keep employees and customers satisfied. For details write . . .

STEINER

STEINER COMPANY

Dept. 60-5, 740 Rush Street • Chicago 11, Illinois

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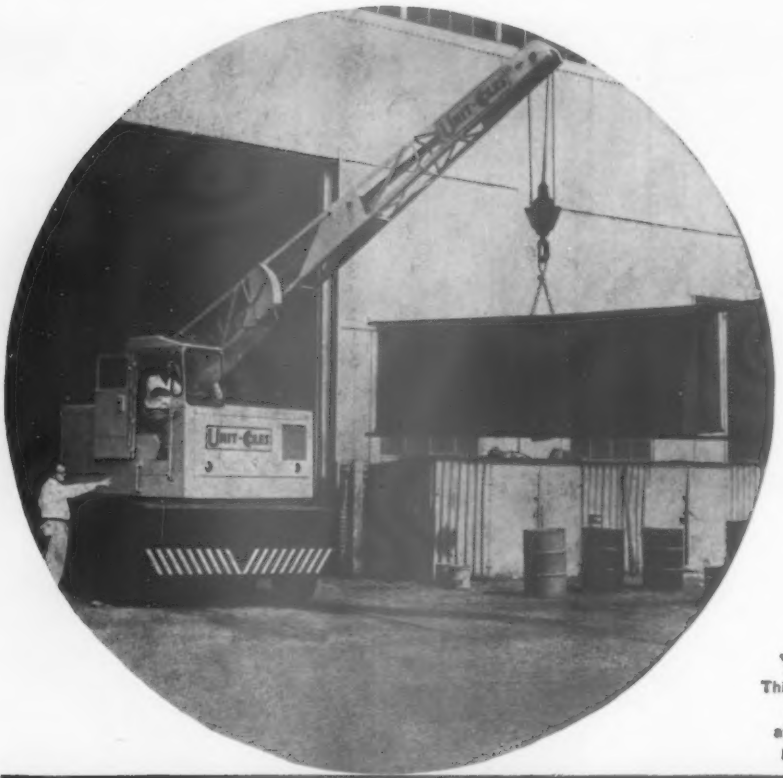


UNIT-COLES
UNIT-COLES
UNIT-COLES
UNIT-COLES

■ *the world's* ■
■ *safest crane* ■

YOU CAN'T OVERLOAD THIS CRANE!
This Automatic Safe Load Controller weighs each load — visually and audibly warns operator attempting unsafe lift — automatically stops and holds hoist motions if warnings are ignored.

CLOSE-QUARTER WORKABILITY *WITH INDEPENDENT ELECTRIC POWERING OF* **ALL** *MOTIONS FOR* SWIFT, SAFE PICK-N-CARRY HANDLING

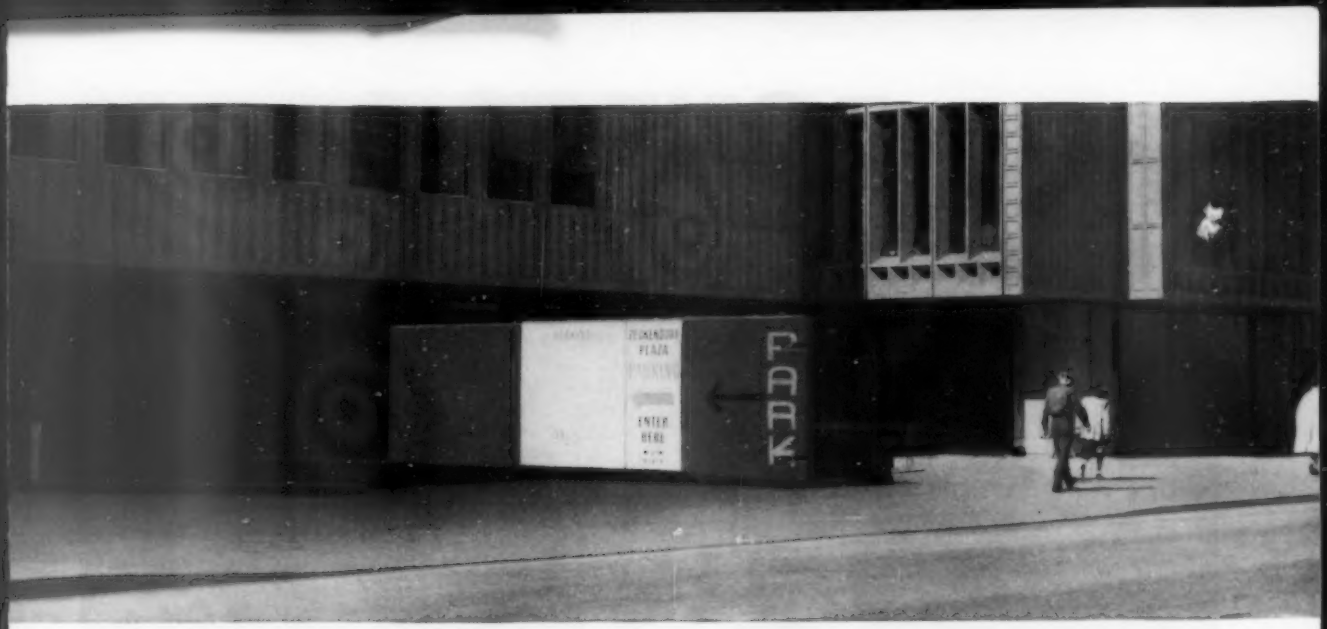
■ *This Midwestern metal fabricating firm has the problem of moving heavy, cumbersome sections from its structural and fabricated steel department to out-of-door storage areas. Chosen for the job is this self-propelled UNIT-COLES mobile crane — the only rig offering so many outstanding advantages essential to swift, safe pick-n-carry handling.*

UNIT-COLES' cantilever-type boom, with its low overall height, makes this crane ideal for in-plant pickups and for moves through low clearance doorways. Tail swing and turning radius are shortest of any American-made full-circle revolving crane, enabling a **UNIT-COLES** to travel and swing a full 360° in a narrow 12-ft. aisle. Electrically-driven independent swing and travel plus instinctive steering control — "left-for-left" and "right-for-right" with cab in any position — provide unlimited maneuverability in the tightest spots. Load-hoist and boom-hoist are actuated by fast, smooth, positive electric power . . . can be operated simultaneously or individually while the crane is in motion. Automatic braking on all crane motions plus automatic protection against over-travel of boom and block constantly protect men, machine and load. There's so much more you should know about a **UNIT-COLES**. Why not call your dealer soon for an analysis of your handling requirements? In the broad line of **UNIT-COLES** cranes — capacities range from 5 to 55 tons — there's the exact size machine to match your needs.

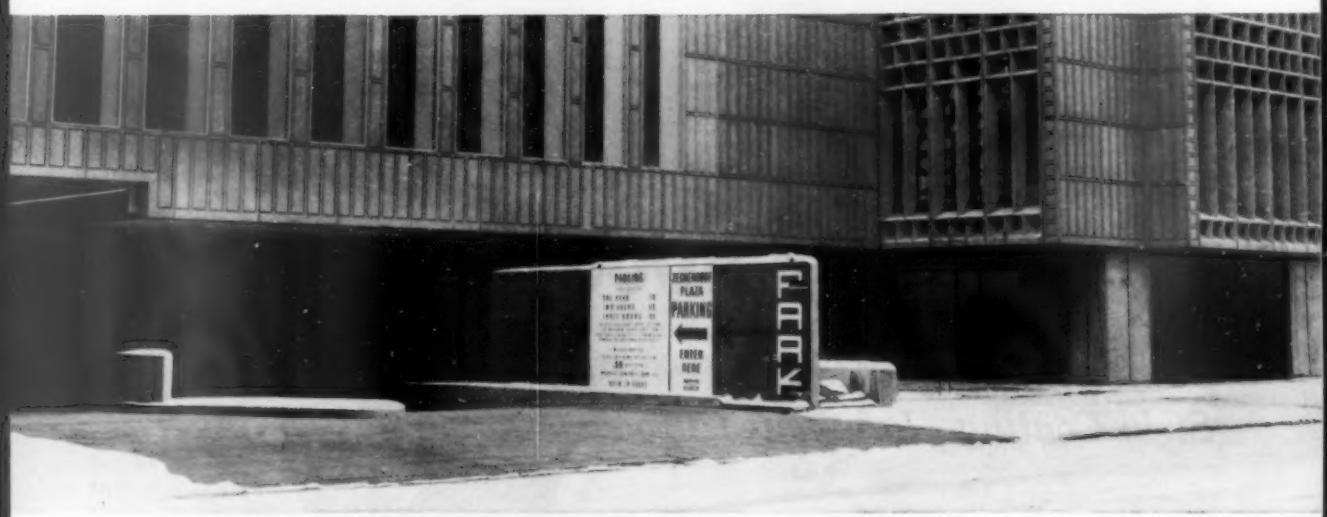
UNIT

UNIT CRANE & SHOVEL CORP.
6703 W. Burnham Street
Milwaukee 19, Wisconsin

For more facts Circle 550 on Reader Service Card



Which paving has a SpanGrid snow melting system?



Parking garage saves money on first snowfall!

Nobody had to push a shovel, spread ashes, or scatter salt or chemicals at this Denver parking garage when the season's first snow arrived last fall. Instead, it was business as usual. No drivers were delayed getting in or out. No passing pedestrian risked his neck on a slippery sidewalk. The SPANGRID Steel Pipe snow melting system simply melted the snow as it fell.

It can be "business as usual" at your plant or shop or office building every time it snows when you have a SPANGRID Steel Pipe snow melting system at work. The initial investment will probably be less than you think. And it will pay for itself over the years in terms of wintertime convenience, savings in snow removal labor and materials, prevention of paving damage from chemical action, and elimination of an accident hazard.

The SPANGRID system laid under your walks or drives can be tied in to your hot water heating system and put into action whenever the need arises. Top-quality SPANGRID Steel Pipe has proven itself in many snow melting installations and will provide you with years of trouble-free service.

SPANG does not install these systems. We concentrate on making top-quality pipe. But your contractor will be glad to give you an estimate on a snow melting system, explain how it works and handle the installation for you. Be sure to tell him to use SPANGRID Steel Pipe . . . made in U.S.A. Why not give him a call right now?

SPANG CW STEEL PIPE

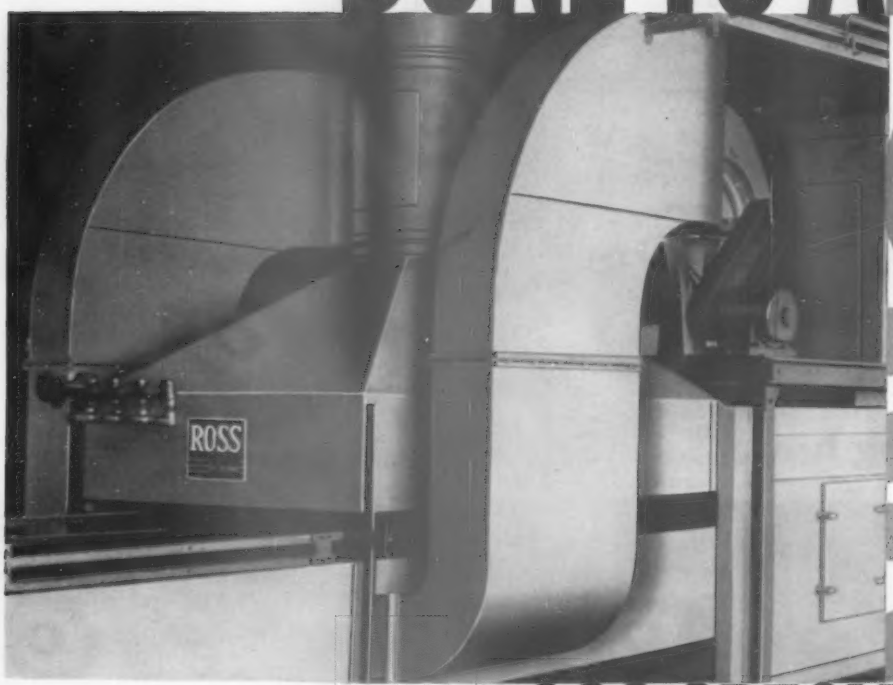
THE NATIONAL SUPPLY COMPANY

Two Gateway Center, Pittsburgh 22, Pennsylvania

Subsidiary of Armco Steel Corporation

For more facts Circle 551 on Reader Service Card

DONE TO A TURN



in a ROSS SPECIAL OVEN

Paint Finishing · Metal Decorating · Rubber Curing
Strip Coating · Laminated Products · Material Drying

If yours is a product that needs to be baked or cured just so, you'll be happy as a clam with a ROSS Custom Oven. These ovens will meet performance specs on the nose... Ross Ovens will out-perform any other oven.

And ROSS can provide any and all types of ovens... Batch or Continuous, Straight-Pass or Multi-Pass, floor, overhead or tower, single-zone or multi-zone, one oven or a complete finishing line. ***Write today for Bulletin ID 300.***

M-R

J.O. ROSS ENGINEERING

A Division of Midland-Ross Corporation/730 Third Ave., New York 17, New York

ATLANTA • BOSTON • DETROIT • LOS ANGELES • SEATTLE • MT. PROSPECT, ILL.

For more facts Circle 552 on Reader Service Card

FACTORY

FREE YOUR COPY OF THE NEW ALDEN SYSTEMS HANDBOOK

At last . . . one place to get the answers to your manufacturing problems . . . whether it's parts handling at the work place . . . setting up a stockroom . . . running a power line . . . lighting a factory . . . operating in less space . . . or setting up an entire production line, you'll find the answer in the ALDEN SYSTEMS HANDBOOK . . . 56 pages packed with money saving ideas on production . . . articles . . . case histories . . . problem solutions . . . cataloging and prices together with the complete ALDEN WORK CENTER SYSTEM STORY.

The ALDEN WORK CENTER SYSTEM will cut costs, increase profits and yield more production from less space in your present plant. To "fuse your new plant to the future" it's a must!

Write For Your Copy Today To
ALDEN SYSTEMS COMPANY
ALDEN RESEARCH CENTER 9 WASHINGTON STREET
WESTBORO, MASS.

For more facts Circle 553 on Reader Service Card

MR. INDUSTRIALIST

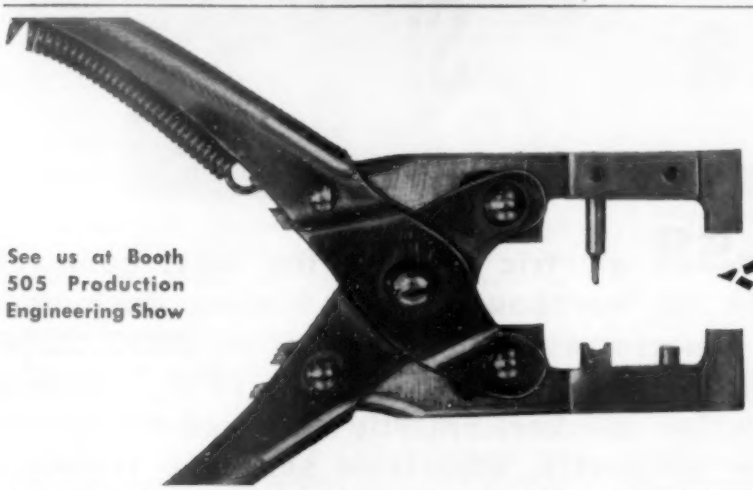
A NEW PLANT SITE
In the HEART of INDUSTRIAL AMERICA
GREENVILLE, PENNSYLVANIA

DO YOU REQUIRE	YES	NO
Location MIDWAY between PITTSBURGH, CLEVELAND and ERIE	☐	☐
Served by FOUR MAJOR RAILROADS	☐	☐
Unlimited ELECTRIC POWER and NATURAL GAS SUPPLY	☐	☐
Municipal-type WATER SERVICE; SEWAGE DISPOSAL FACILITIES	☐	☐
IDEAL HOME SITES	☐	☐
Modern SCHOOLS and Liberal Arts COLLEGE	☐	☐
Excellent RECREATIONAL OPPORTUNITIES	☐	☐
DO YOU REQUIRE		
★ ★ FOR LEASE Industrial type building — Rail Siding Sprinklered — 30,720 Sq. Ft. — 13' 2" Clearance	☐	☐
★ ★ ★ FOR SALE or LEASE Industrial type building — Rail Siding Sprinklered — 25,000 Sq. Ft. — 14' Clearance	☐	☐

All YES Score indicates you should write for FREE booklet and further information to:

REYNOLDS DEVELOPMENT
ROBERT B. PARKER, JR., Managing Engineer
P.O. Box 606 Greenville, Pa.

For more facts Circle 554 on Reader Service Card



See us at Booth 505 Production Engineering Show

Sargent has a plier-type tool that'll save you money

Every Sargent tool is tailor-made for **one** particular job. This means top performance . . . saving you time and money far beyond that of an ordinary "all purpose" tool.

If there isn't a Sargent tool that'll handle your job, we will make a "special" for you. Because of Sargent's unique component part construction "specials" are easily designed to fit your specifications.

SARGENT
hand tool division

SARGENT & COMPANY, New Haven 9, Conn. 22-H

Please send Sargent's Hand Tool Manual containing industrial application data for plier-type tools and selected case histories.

Name_____ Title_____
Company_____
Street_____
City_____ Zone_____ State_____

Sargent plier-type tools cut • strip • punch • bend • twist • form • straighten • pull • push • insert • extract • press • crimp • squeeze • set • grip • and spread

For more facts Circle 555 on Reader Service Card

New Yale K-58 electric truck is the most compact rider truck of its type for warehousing and loading dock use. Pivots, not just turns, in narrowest aisles. Capacities: 2000, 2500 and 3000 lbs. High lifting speeds ... up to 150 FPM ... enable it to handle more materials quicker. Smartly designed for easier operation, it offers low silhouette, adjustable seat, top visibility, more leg room. Other Yale features: Mechanically Actuated Carbon Pile speed control, far less subject to damage, provides smooth, infinite speed range with low maintenance.

For more information, contact your Yale representative, or write to The Yale & Towne Manufacturing Company, Materials Handling Division, Philadelphia 15, Pa., Dept. K-6.

Yale Materials Handling Division, a division of The Yale & Towne Manufacturing Company. Manufacturing Plants: Philadelphia, Pa., Forrest City, Ark. Products: Gasoline, Electric, Diesel, and LP-Gas Industrial Lift Trucks • Worksavers • Warehousers • Hand Trucks • Industrial Tractor Shovels • Hand, Air, and Electric Hoists.

YALE®
INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS • HOISTS
YALE & TOWNE

For more facts Circle 556 on Reader Service Card

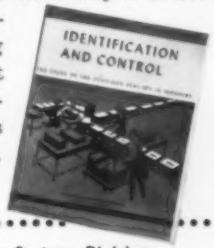
THERMADOR DISCOVERS 50% SAVINGS IN CARD PROCESSING TIME

This time-saving Dennison Dial-Set System is the idea of Thermador Electrical Mfg. Co. They discovered it in the "Identification and Control" book described below. They figured that the Dennison Dial-Set method would cut hours off the work of adding model and serial numbers to pre-printed warranty cards for Thermador heaters, ranges, refrigerators and other electrical products. How right they were!

Time study proves 50% savings! Before Dennison Dial-Set, two production men spent 10 hours a week rubber-stamping warranty cards as needed on the production line. With Dial-Set, each day's cards are coded and consecutively numbered in advance by a single operator in an hour.

Extra dividends earned! With accurate, legible cards always on hand, Thermador's system of matching the right card to the right serial plate is now far more effective. Moreover, the same Dial-Set Machine is now processing inspection tags for bathroom heaters several times faster than the former hand-operated stamping machine method. Happily, both Thermador system forms required only minor changes to adapt them to Dennison Dial-Set.

It will pay you to look through the Dennison book! Like Thermador, you're sure to find a Dial-Set System that will readily fit your procedures among the 63 forms illustrated in this 24-page book. You'll also learn why Dial-Set's fool-proof copy setting and 165-impressions-a-minute imprinting speed provide the most efficient method of adding variable information to preprinted cards, tags and labels . . . in long or short runs. Mail the coupon today.



Dennison Manufacturing Co., Machine Systems Division, Dept. H-104, Framingham, Massachusetts

Please rush your "Identification and Control" book, describing how Dennison Dial-Set Systems save time and money in identifying products and parts and controlling production, inspection, reordering, piece-work operations, warehousing and shipping.

Name..... Title.....

Company.....

Address.....

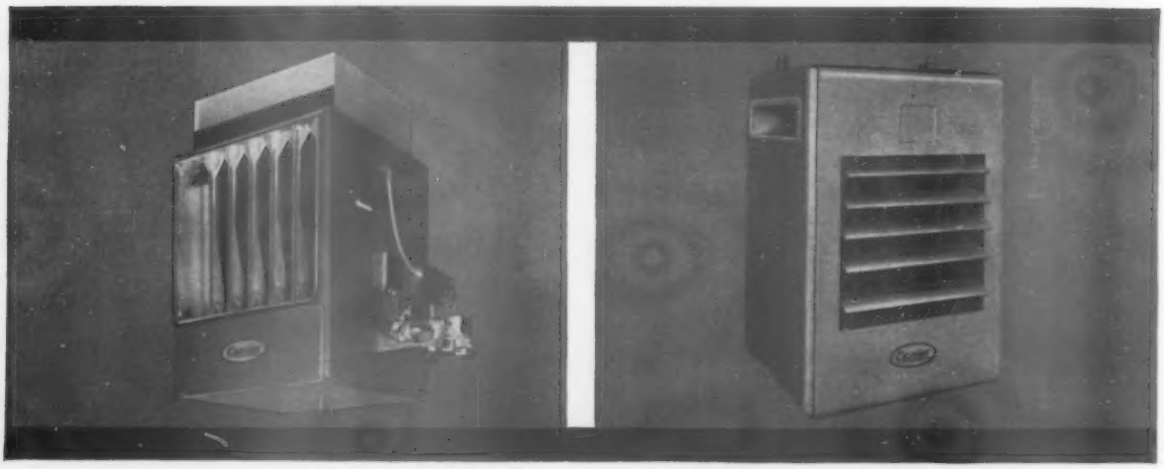
City..... Zone..... State.....

Dennison *Helping you compete more effectively*

For more facts Circle 557 on Reader Service Card

Carrier announces new duct furnaces and gas-fired unit heaters

with heat exchangers of durable jet-age Strato-Steel!



NEW DUCT FURNACES available in 8 sizes with individual capacities from 50,000 to 250,000 Btu/hr. Designed for multiple installations of over 1,000,000 Btu/hr. A.G.A. approved.

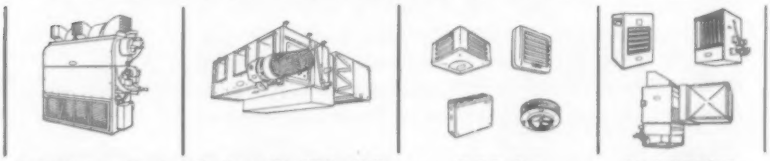
NEW GAS-FIRED UNIT HEATERS available in 9 sizes with capacities from 25,000 to 225,000 Btu/hr include as standard equipment many features usually offered as accessories. A.G.A. approved.

Here's an advance that assures you better performance than ever in these two new Carrier lines. It's Strato-Steel—a completely new material developed for the exhaust pipes of supersonic jet aircraft. Used in the heat exchangers in every model of Carrier's new heaters, Strato-Steel provides a new standard of protection against high temperatures and corrosion. Along with new design, it provides new economy and efficiency of operation.

Whatever the job, large or small, there's a new Carrier Furnace or Unit Heater to handle it to your satisfaction. For complete information on the new products, call your Carrier Unit Heater Agent or Wholesaler, listed in the Yellow Pages under "Heaters—Unit." Or, if you prefer, write direct to Carrier Air Conditioning Company, Syracuse 1, New York.

Carrier offers every type of equipment for any commercial or industrial job

Carrier



Heat Diffusers—Direct Fired for gas or oil

Heating and Ventilating Units for steam and hot water

Unit Heaters for steam and hot water

Gas Unit Heaters and Duct Furnaces

Seiberling

INDUSTRIAL GLOVES

Longer wear in every pair! Available in various sizes, gauges, lengths, colors and surface finishes. Natural rubber or genuine Dupont neoprene latex. Contoured fingers for more comfort, better fit.

EXCLUSIVE PATENTED

FIRMGRIP®

SAFETY GRIP MOULDED INTO FINGERS AND PALM

SEND FOR CATALOG NO. G-3 of complete glove line

FREE TEST OFFER!

Write us on your firm's letterhead for sample gloves for test purposes.

SEIBERLING LATEX PRODUCTS
New Bremen, Ohio

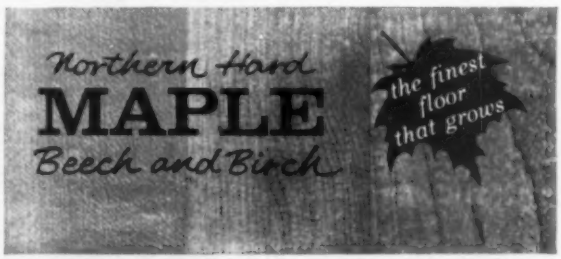
For more facts Circle 559 on Reader Service Card

tough—*and beautiful!*

The *beauty* of MFMA Northern Hard Maple floors doesn't cost you a dime. You get *more* of every *other* floor value than any synthetic can deliver. You get the brawny strength Maple adds to a structure—its lifelong ability to fight traffic wear—low-cost upkeep—easy refinishing ("always a new floor underneath"). Workers like its foot-friendly comfort. Its brightness stimulates quality work standards. A tool dropped on Maple is rarely harmed. All this makes its unique beauty a *pure bonus,* for new work or modernizing.

For bright, modern style / *See Sweet's Arch. 13J-Ma or write—* / *For lifetime endurance*

MAPLE FLOORING MANUFACTURERS ASSOCIATION
Suite 571 • 35 E. Wacker Drive • Chicago 1, Ill. 64



For more facts Circle 560 on Reader Service Card

"SAFETY-WALK"® boosts efficiency

Provide firmer traction and better leverage—improve employee efficiency, with "SAFETY-WALK" Brand Non-Slip Surfacing. This tough mineral-coated fabric goes on in minutes on stairways, walkways, ramps, around machines, almost anywhere. Gives sure footing, even under water, oil, or grease. Helps prevent accidents and end costly claims. Easy to keep clean . . . stands up under years of wear.

"SAFETY-WALK" is patterned in strips, tiles, and cleats and available in four attractive colors: red, silver, green and black. See how this versatile material can serve your needs . . . call your local wholesaler or 3M branch office or send today for free sample.

"SAFETY-WALK" IS A REGISTERED TRADEMARK OF 3M CO., ST. PAUL 6, MINN.
EXPORT: 99 PARK AVENUE, NEW YORK 16, N. Y. CANADA: LONDON, ONTARIO.

MINNESOTA MINING AND MANUFACTURING COMPANY
. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

FREE SAMPLE

Minnesota Mining and Manufacturing Company
St. Paul 6, Minn. Dept. AAE-80.

Send me my free sample of "SAFETY-WALK"

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

For more facts Circle 561 on Reader Service Card

RECOIL!

RUBBAIR® DOORS have "recoil-ability".

. . . the ability to bounce back from impact of heavy industrial or fork-lift truck equipment. Because RUBBAIR DOORS are made of rubber, they flex and absorb heavy punishment, far beyond the capacity of conventional metal-clad doors.

The "recoil-ability" and "bounce" feature gives you longer factory-tested door life and extremely low maintenance costs. The rugged flexibility and automatic closing of RUBBAIR DOORS assure trouble-free operation, safety, lowered heat loss and cleanliness.

Remember . . . only RUBBAIR® DOORS have *"recoil-ability"!*

Money saving features of RUBBAIR DOORS are:

- Flexible Construction
- Safety Cushion Nose
- Scuff-Resistant Wear Panels
- Rugged V-Cam Hinges
- Positive Air Seals
- Shatter-proof Windows

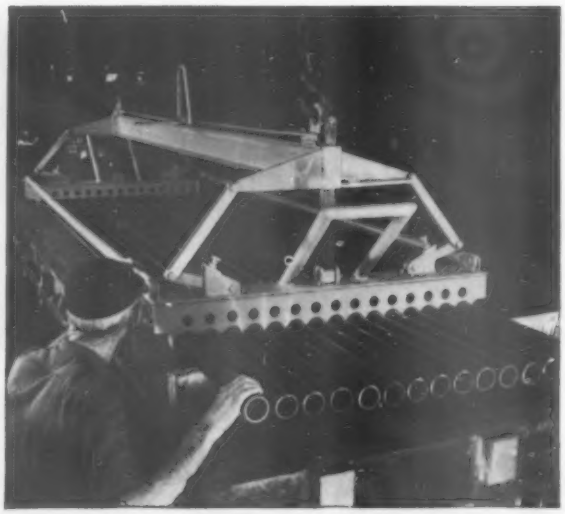
If you have an industrial door maintenance problem, "recoil-ability" may solve it. Write for details, today.

® MANUFACTURING CO., INC.

Stic-Klip

RUBBAIR® DOOR DIVISION
60 Regent Street
Cambridge 40, Mass.

Distributorships available in protected territories.

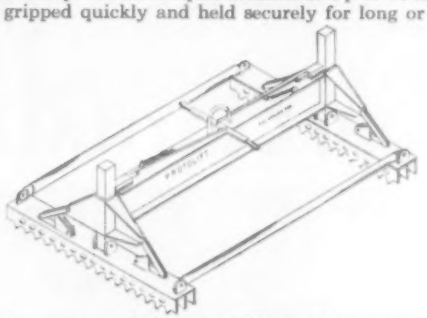


"We reduced our handling cost 50%" ...with new HEPPENSTALL PROTOLIFT*

Here's what Mr. W. D. Davis, Houston, Texas, Terminal Manager for T. E. Mercer Trucking Company, has to say about Protolift:

"Our 15 joint, 2⅜" O.D. Protolift has handled as much as 100,000 feet a day, reducing our handling cost 50% over rolling or sling lifting. It has handled over 300,000 tons of casing, with no maintenance except lubrication."

In one lift, Protolift picks up an entire row of pipe, tubing or cylindrical products of equal diameters. Up to 15 lengths can be gripped quickly and held securely for long or short hauls.



To grip, one row of alloy steel "fingers" turn around the outside surface of the pipe . . . while another row turn around the opposite side. Thus, each length is gripped around more than half its circumference, at both ends.

Protolifts in use at the present time handle up to 15 lengths of pipe or tubing. Why not see if Protolift can't cut *your* handling costs? Write today for data sheet, or tell us your requirements and we'll give you specific information and a quotation.

SEE PROTOLIFT IN ACTION. *We'd like to show you an 8-mm color film, demonstrating Protolift in actual use.* Address your inquiry to Heppenstall Company, Materials Handling Division, New Brighton, Pa. *Patented 9250

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Pittsburgh 1, Pennsylvania
Plants: Pittsburgh and New Brighton, Pa. • Bridgeport, Conn.

MIDVALE-HEPPENSTALL COMPANY
Nicetown, Philadelphia 40, Pa.

Die Blocks · Forgings · Back-Up Roll Sleeves · Rings · Industrial Knives
Materials Handling Equipment · Pressure Vessels · Hardened and Ground Steel Rolls · Vacuum and Consumable Electrode Melted Steels

IF IT HANGS FROM A CRANE... HEPPENSTALL CAN HANDLE IT

SEE OUR CATALOG IN SWEET'S PLANT ENGINEERING FILE OR WRITE FOR COPY

How Greenlee Bros., Rockford, Ill., Saved $19,600 in 12 Months with An AO Protection Program

GREENLEE BROTHERS, ROCKFORD, ILLINOIS installed a complete compulsory eye protection program in 1959. The investment quickly paid off in dollars and cents as well as bettered morale, pain-prevented, sight savings, skills protected. And remember, most of the first year's cost of $14,237 is non-recurrent.

VITAL STATISTICS

- 64% reduction in workers making trip to nurse.
- 51% reduction in workers making trip to doctor.
- 90% reduction in lost time hours due to serious eye accidents.
- 3 Eyes Saved*

  *Actually 11 eyes, but 8 of the accidents occurred in the foundries. These were previously covered.
- $19,600 estimated savings.

What plant investment pays off as rapidly? Send for new brochure, "Eyes Are Expensive Targets".

American Optical COMPANY

SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts

Safety Service Centers in Principal Cities

Always insist on AO Trademarked Safety Products

Your Surest Protection . . . AO SURE-GUARD Products

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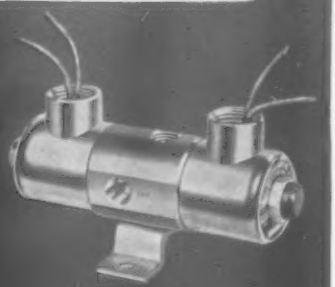

MOMENTARY CONTACT 3-WAY
3/16" orifice – 80psi max.

3-WAY
1/8" orifice – 200psi
3/16" orifice – 80psi

Name any style, capacity or size of electrically-operated valves—2-way, 3-way or 4-way—air, oil, water or vacuum—you'll find them at Airmatic . . . practical in design, compact, precision made and individually tested to full pressure rating.

Our quality is tops. Our deliveries are prompt. Our prices are right and engineering service is yours for the asking.

2-WAY
Maximum 1,500psi

MINIATURE 4-WAY
1/8" or 3/16" orifices

Write for our latest catalog 91024.

AX-27

AIRMATIC VALVE, INC.
7313 Associate Ave., Cleveland 9, Ohio

Phone: WOodbine 1-5320 · WESTERN UNION: Airmatic Valve, Inc., FAX, Cleveland Ohio

"This $65 instrument saves me 60¢ an hour in production costs"

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what TRT does — Shows on tape **exactly when** "down-time" occurs, how long it lasts. Access window enables operator to write reason for stoppage. Visual counter totals **actual productive time.**

how TRT saves — TRT data-on-tape gives accurate, single-source basis for **cost-cutting** in plant or office: time study, production control, **preventive** maintenance, locating bottlenecks. **Write** for free Brochure NR-8.

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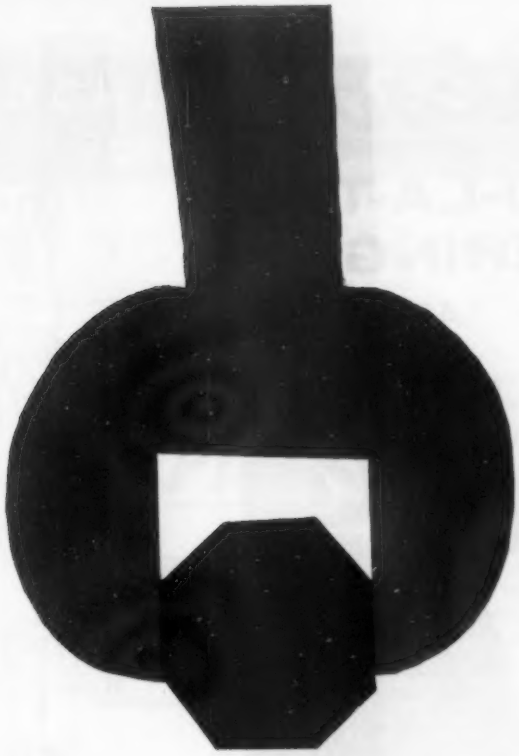

Today's low-cost way to automate your labor costing is with Keysort Data Processing

For labor distribution, production control, operation costing, application of burden rates—for any number of vital plant operations — Keysort is the data processing system to use.

The reasons are many. No restrictive procedures; minimum training; remarkable economy; simplicity of installation and operation.

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Result: Keysort automates your data processing to give you the meaningful on-time information you need for complete control of your plant and your profits. Monthly, weekly, daily. And at truly low cost.

Your nearby Royal McBee Data Processing Systems Representative has had a wealth of experience in solving plant control problems. Working with your plant managers and foremen, with your systems and procedures experts, he can offer helpful advice about a low-cost Keysort system tailored to your individual requirements. Call him, or write us at Port Chester, N. Y. —indicating the applications in which you are interested —and we will be happy to supply you with actual case histories from our files.

ROYAL McBEE · *data processing division*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

Erickson

AR-TIC-U-LA-TED STEERING

TURNS SHORT... LASTS LONG!

This articulated pivot (illustrated above) reduces turning radius to a minimum and gives the advantages of four-wheel steering. It entirely eliminates weaknesses and rapid wear common to complicated conventional steering mechanisms. It is similar to the system used on large, well-known earth movers.

Above is a typical Erickson Low-Lift Platform Truck. Standard models up to 10,000 lbs. capacity. Custom models up to 20,000 lbs. capacity. Platforms custom built up to 6 ft. wide, up to 24 ft. long.

Erickson Hi-Lift Platform Trucks have various platform sizes and lifts available. Stand-up cockpit (as shown) or operator's seat. Standard automotive controls are a feature of all Erickson Platform Lift Trucks.

ERICKSON
the Workhorse of Lift Trucks

Erickson Kart-All materiel-personnel carriers are available with scissors-lift platforms. Airline model shown above has standard baggage bed, 4,000 lbs. capacity. Custom models built with beds up to 8 ft. wide by 24 ft. long, up to 12,000 lbs. capacity. Hydraulic outriggers obtainable for stabilizing Kart-All when loading or unloading heavy loads.

ERICKSON POWER LIFT TRUCKS, INC.

273 St. Anthony Blvd. N. E., Minneapolis 18, Minn.

276 **For more facts Circle 568 on Reader Service Card**

The biggest step in business ...the short distance from the middle to the top

Companies are still canvassing colleges like crazy for bright young engineers and technologists . . .

But what about the man with ten or more years invested in his company? Here he is, ready to take on heavier responsibility. How much longer must he wait?

Upstairs in his company, management will tell you their biggest job is finding new top talent. And what they are seeking most in a man is something more than just his proficiency in his post.

They're seeking an alertness to all phases of the business . . . long range planning, policy-making, new product development and research . . . breadth as well as depth.

The men who edit this particular McGraw-Hill publication for you, recognized this responsibility long ago. They answer it in these pages. Here, is the perspective you need to push ahead. And as you read, keep reaching, for . . .

Men who read more... earn more!

FACTORY

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

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(Not available for Equipment Advertising) $2.40 a line. Minimum 3 lines. To figure advance payment count 5 average words as a line. (See ¶ on Box Numbers.)
POSITION WANTED undisplayed rate is one half of above rate, payable in advance.
BOX NUMBERS count one additional line.

Send New ADS or Inquiries to Class. Adv. of Factory, P. O. Box 12, New York 36, N. Y., for September Issue Closing Aug 15

"Put Yourself in the Other Fellow's Place"

TO EMPLOYERS

TO EMPLOYEES

Letters, written offering Employment or applying for same are written with the hope of satisfying a current need. An answer, regardless of whether it is favorable or not, is usually expected.

MR. EMPLOYER, won't you remove the mystery about the status of an employee's application by acknowledging all applicants and not just the promising candidates.

MR. EMPLOYEE you, too, can help by acknowledging applications and job offers. This would encourage more companies to answer position wanted ads in this section.

We make this suggestion in a spirit of helpful cooperation between employers and employees.

This section will be the more useful to all as a result of this consideration.

Classified Advertising Division

McGRAW-HILL PUBLISHING CO., INC.

330 West 42nd St., New York 36, N. Y.

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Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

To head maintenance and construction department for company's rapidly expanding division operating in the Chemical and Plastics industry. You will report directly to the division manager. Minimum of ten years experience required, including five years of supervision.
Plant located near Boston area.

PRODUCTION DIRECTOR

Wanted by large American capital equipment manufacturer. Successful candidate to reside in London and take charge of production organization for 1,000 man plant doing $7,000,000 annually.

Minimum length of assignment five years. Prefer British subject desirous returning to England but this condition not prerequisite.

Successful candidate must have minimum ten years experience in production control techniques required for overall management of Production Department with emphasis on coordination of engineering, manufacturing, purchasing, delivery schedules, etc. Present factory well managed at manufacturing level but requires overall production administrator.

Salary open and commensurate with background and abilities.

P4899 Factory
Class. Adv. Div., P.O. Box 12, N.Y. 36, N.Y.

INDUSTRIAL ENGINEERS

Staffing new department of active nationally known firm with industrial engineers having at least three years in methods, MTM and standards or related experience. Degree helpful, but not needed. Positions place you on ground floor of fast expanding firm (not defense). Starting salaries up to ten thousand dollars. ($10,000). Fee paid. Send resumes promptly.

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Every breath he takes is guarded with Polyken tape

Here's how the R. E. Darling Co., of Bethesda, Md., uses Polyken cloth utility tapes in the manufacture of oxygen tubes for the U. S. Navy and U. S. Air Force. A rubber tube is placed on a mandrel, mounted on a lathe and a flexible steel spring is slipped over it. Polyken tape is then wrapped on, to hold the spring firmly against the tube, and to prevent breakthrough of the highly flexible spring. Nylon stockinet cover completes the long-wearing and highly dependable oxygen hose unit.

Tough, flexible Polyken cloth utility tapes have a variety of vital uses— often where you least expect them

Surface and tool protection, motor work, coil winding, hinging, masking, sealing, storing, binding, reinforcing and all-around utility work. These are just some of the applications where Polyken tape has replaced more expensive—and often less practical—materials in modern manufacturing.

What makes Polyken so versatile? There's the high holding power of its adhesive mass . . . clean removal . . . high tensile strength cotton cloth . . . long-wearing resistance to abrasion and moisture. See what Polyken can do for you.

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Polyken®

INDUSTRIAL TAPES

THE KENDALL COMPANY
Polyken Sales Division

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SEARCHLIGHT SECTION
(Classified Advertising)
F. J. Eberle, Business Mgr.

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replacement bearings
you need them F-A-S-T!

Your ROLLWAY Distributor has the Cylindrical Roller Bearings you need on the shelf!

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NAME..... TITLE.....

Card Good Only Through November 1960

COMPANY..... August 1960-2

CITY AND STATE.....

STREET.....

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NAME..... TITLE.....

Card Good Only Through November 1960

COMPANY..... August 1960-1

CITY AND STATE.....

STREET.....

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Catalogs in This Issue

To help you, here is a list of catalogs described in this issue. To obtain, circle key numbers on either postcard.

PRODUCTION
1—Automation Equipment
2—Portable Power Tools
3—Drilling Machines
4—Filler Metal Selection Chart
5—Grinding Wheels
6—Welding Equipment
7—Testing Equipment
8—Carbide Tools
9—Gyratory Screen
10—Extruded Rectangles
11—Equipment Leasing
12—Band Mill

BUILDING
13—Partitioners
14—Facing Tile
15—Fibrous Glass Panels
16—Thermal-Raye Heating

ELECTRICAL
17—Lighting Equipment
18—Transformers
19—Circuit Breakers
20—Clutches, Brakes
21—Bus Ducts
22—Floodlights
23—Drives
24—Switches
25—Motors

AUXILIARY
26—Centrifugal Fans
27—Water Heaters
28—Air and Vacuum Pumps
29—Infra-Red Heaters
30—Fans
31—Waste Handling Pumps
32—Rotary Pumps

MATERIAL HANDLING
33—Conveyors
34—Slings
35—Lifting Attachments
36—Fork Truck
37—Suspension Hopper Scales
38—Jib Cranes
39—Conveyor Lubricator
40—Material-Handling Equipment

MECHANICAL
41—Wedge Drive
42—Pumps
43—Boosters
44—Variable Speed Sheave
45—Poly-V Drives

MAINTENANCE
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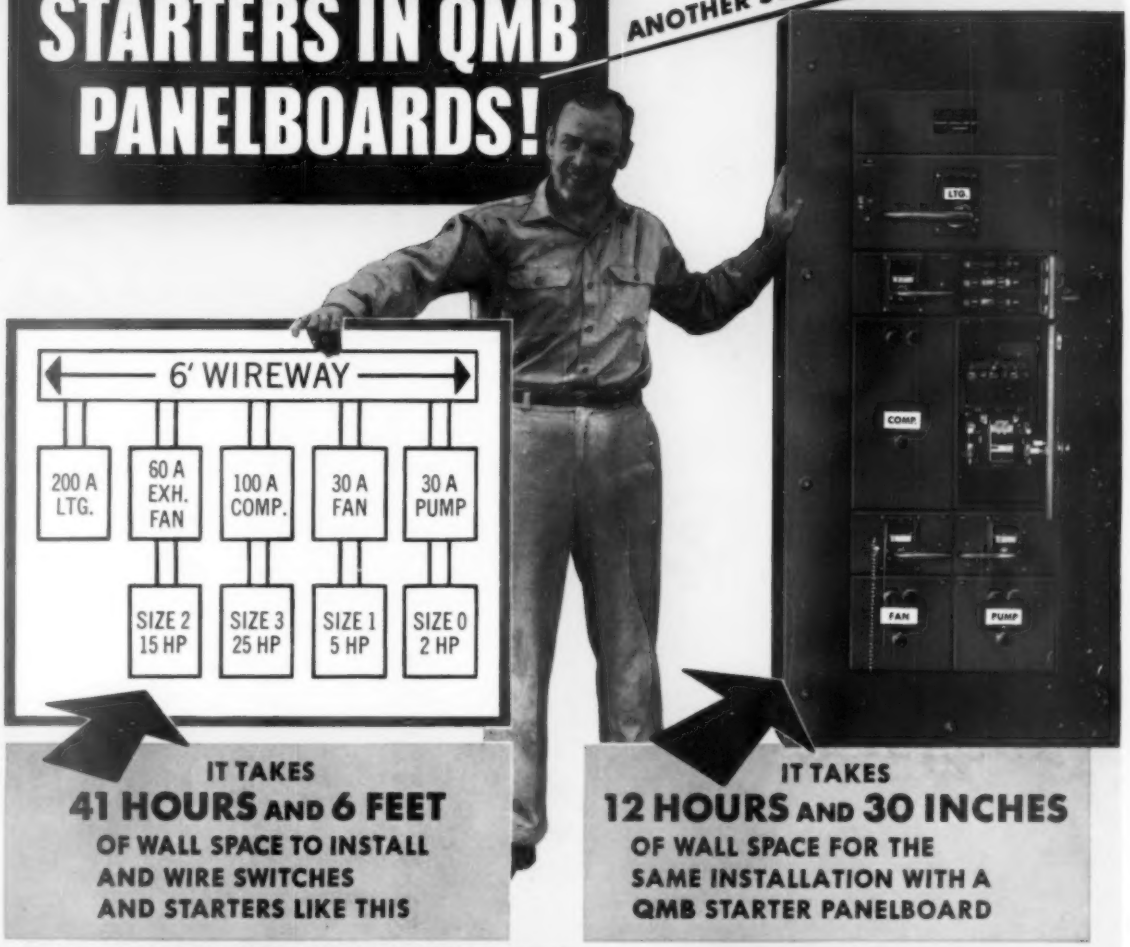
47—Wash Units, Showers
48—Multi-Job Washer
49—Key Equipment
50—First-Aid Kits
51—Incentive Awards

INSTRUMENTS AND CONTROLS
52—Pneumatic Instruments
53—Digital Information System
54—Control Systems
55—Gas and Liquid Controls
56—Oscillograph
57—Control Valves

PIPES AND VALVES
58—Diaphragm Valves
59—Hose
60—Tubing
61—Regulators
62—Steam Traps
63—Gate Valves

STARTERS IN QMB PANELBOARDS!

ANOTHER SQUARE D FIRST!



IT TAKES
41 HOURS AND 6 FEET
OF WALL SPACE TO INSTALL AND WIRE SWITCHES AND STARTERS LIKE THIS

IT TAKES
12 HOURS AND 30 INCHES
OF WALL SPACE FOR THE SAME INSTALLATION WITH A QMB STARTER PANELBOARD

QMB MEANS LESS TIME AND LESS SPACE PLUS

- **LOWER COST** • Time is money. The overall cost of QMB motor starters is usually less than that of separately installed starters and switches.
- **PLUG-IN FLEXIBILITY** • Plug-in switches and starters can be removed and installed in minutes. Minor circuit changes can be made without costly down time. Components easily rearranged if processes change.
- **ADDED SAFETY** • Interlocking prohibits opening starter or switch doors when switch is "ON."

QMB panelboards accommodate reversing and non-reversing starters, sizes 0 through 4. QMB switchboards and unit substations handle sizes 0 through 5. Part winding and two-speed starters available on order. All components available factory-assembled and wired. Enclosures, starters and plug-in switch units are also stocked by your Square D distributor for on-the-job assembly.

Notice how the PLUG-IN switch unit is mounted directly above the starter, permitting interlocking. The starter cannot be opened when the switch is in the "ON" position.

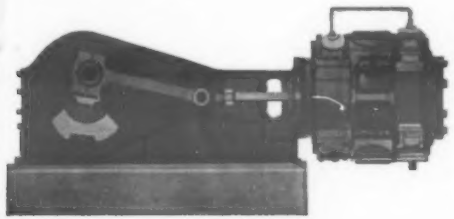
It's easy to order these starter and switch units. See your latest Square D Digest for further information.

SQUARE D COMPANY

wherever electricity is distributed and controlled

For more facts circle 383 on READER SERVICE CARD

For more facts circle 384 on READER SERVICE CARD →



HIDDEN VALUES?

Are they all in Worthington Horizontal Compressors?

Frankly, they're not. And we're glad! One of the "hidden values" listed below we'd hate to sell—see if you can tell which one it is. (Correct answer on page 248.)

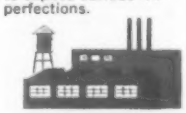
On the other hand, we're extremely happy to be selling horizontal compressors with the other 24 "hidden values" built in. (Not everyone does.)

Frankly, we could drop many of these and 99 users out of 100 might never know it. But the 100th could suffer untold expense . . . so we keep them all for everyone. To buy these "hidden values", please contact your local Worthington representative next time you specify a compressor. Worthington Corporation, Compressor and Engine Division, Buffalo, N. Y. 36-10

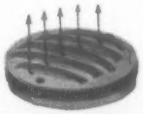
SALES AND SERVICE INTEGRATION recognizes kinship of one to the other. One man administers both.

MAGNAFLUX AND MAGNAGLO inspections are widely used to expose surface imperfections.

ADJUSTABLE ROLLER MAIN BEARINGS feature low friction losses which help to extend compressor life.



INTEGRATED DIV. includes foundry, manufacturing, sales, service and engineering in one location.



FEATHER VALVE — industry's preferred compressor valve—is efficient, quiet, and low in maintenance.

CAPACITY CONTROL —choice of simple bypass, through dual to complex sequential control systems.

FLEXIBILITY — oil or non-lube; single or multi-stage; Worthington MVD, direct or geared drive.

PARCO-LUBRITING of critical wearing surfaces completely eliminates most start-up scuffing problems.

ULTRASONIC TEST — an advanced method of examining certain critical parts for internal quality.

ACCESSIBILITY — valves, packing and main parts are easily observed and reached by operators.

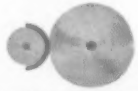
ONE-PIECE FRAME includes built-in housing with full foundation support to minimize stresses.

2000 CRAFTSMEN, these units built by same men who design and build large 5000 hp, 15,000 psi units.

KOLENE PROCESS removes impurities from crankpin bearing shell that weaken bond to babbitt.

OPTIC COMPARATOR is used to check connecting rod bolt threads for uniform angles, lead and form.

FACTORY ASSEMBLY and shop run-in on air insure proper operation and reduce installation costs.



FINISHED GROUND BEARING SHELLS provide crankpin positive full-contact backing for long life.

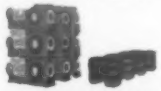
COMPOSITION TEST determines constituents of molten iron in each ladle before any casting is poured.

$1,000,000 ADDITION TO LABORATORY assures sound equipment designs based on actual research.

COUNTERWEIGHTED CRANKSHAFT eliminates vibration and insures a smoother operation.

DISTRIBUTORS — over 200 in major markets give local supply and close contact with Worthington offices.

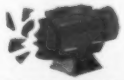
FULL-FLOATING WRISTPINS in piston give minimum piston and cylinder wear and reduce maintenance.



STOCKING PROGRAM standard air and gas gathering units are kept in stock to give short shipments.

PROFILOMETER inspection of highly finished parts assures easy break-in and long life.

THERMODYNAMICS SECTION analyzes special application to size unit and determines performance.



DESTRUCTION TEST of complete compressor cylinders verifies engineers' design calculations.

WORTHINGTON